

PYCNOGONIDA FROM SOUTHERN BRAZIL

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Records of Pycnogonida collected at 85 different stations in southern Brazil, between 18°34' S and 34°27' S. Four of these were sampled by hand or by skin-diving in the littoral and upper infralittoral zones, six stations were located on the continental slope between 250 and 1100 m, the remaining 75 were on the continental shelf. Forty-four species are represented, dispersed over 16 genera in seven families. Seven species are new to science, in the genera *Eurycyde* (*E. platyspina* sp. n.), *Achelia* (*A. columnaris* sp. n.), *Nymphon* (*N. bullatum*, *N. inaequipes*, *N. vulcanellum* spp. n.), *Anoplodactylus* (*A. spurius* sp. n.), and *Pycnogonum* (*P. ornans* sp. n.). New to the fauna of Brazil are eight species. New synonymies are proposed in *Pallenopsis* (*P. boehmi* Schimkewitsch, 1930 = *P. longicoxa* Stock, 1966) and *Anoplodactylus* (*A. petiolatus* (Krøyer, 1844) = *A. guyanensis* Child, 1977).

J.H. Stock, Institute of Taxonomic Zoology, P. O. Box 4766, 1009 AT Amsterdam, The Netherlands.

Key words. – Pycnogonida, taxonomy, distribution, Brazil, littoral, shelf, continental slope.

The pycnogonid fauna of southern Brazil is relatively well-studied, mainly through the monographic treatment of Marcus (1940b) and a number of satellite papers in the following decades by Corrêa (1948), Sawaya (1945, 1947, 1950, 1951), Zilberberg (1963), Zago (1970), de Mello-Leitão (1945, 1946, 1949 a, b, 1955), Marcus & Marcus (1963) and Marcus-du Bois-Reymond (1952). Occasionally, large expeditions collected material on the Brazilian coast, e.g. the 'Challenger' (Hoek 1881), the 'Vettor Pisani' (Schimkewitsch 1890), the 'Calypso' (Stock 1966), and some American cruises (Child 1982a). Nevertheless the present collections from southern Brazil form a fine addition to our previous knowledge. The material was brought together by the late Dr. Plínio Soares Moreira of the Instituto Oceanográfico of the University of São Paulo (USP), mainly on board of the Oceanographic Research Vessel 'Prof. W. Besnard'.

The amount of previous work done explains why the number of new species in the present collection is relatively low (7 out of 44, or 16%). However, taken into consideration that another eight species are new to Brazil, a total of 15 species is added to the Brazilian fauna, which is not too bad a score (more than one-third of the species represented in this collection).

Biogeographically, endemics and warm-water species are predominant in the Brazilian fauna, not surprising in the light of the South Atlantic Drift which distributes tropical waters along major parts of the coastline of the country.

As table 1 shows, a good number of species (viz.

21) is endemic to Brazil (and neighbouring territories, the Mar del Plata and the Guyanas). Another group of eleven species are mainly warm-water elements which have their distribution centre in the Caribbean. One of these species, *Ammothella spinifera*, occurs on the Pacific coasts of the Americas as well. Interesting is a small group of seven species occurring on both sides of the Atlantic Ocean (so-called amphi-Atlantic species). Finally, some Magellanean cold-water species reach their northern distribution limits on the shelf of southern Brazil, but this group contains only three species in all.

METHODS

Entire specimens were studied and measured in glycerin or lactophenol, dissected appendages on permanent slides in Reyné's modification of Faure's medium. All specimens have been deposited in the Zoölogisch Museum, Amsterdam (ZMA).

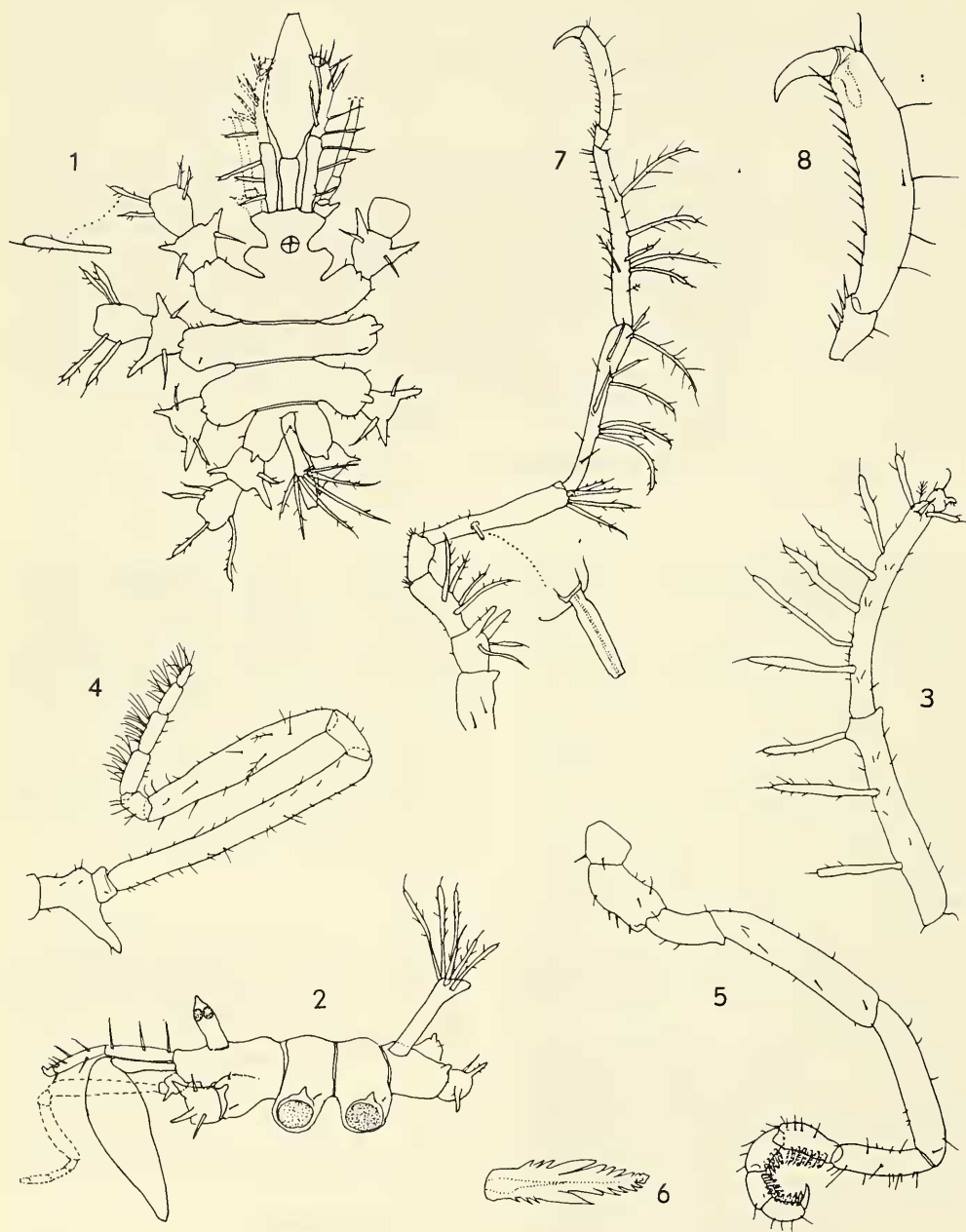
DESCRIPTIVE PART

Family Ammotheidae

Eurycyde platyspina sp. n. (figs. 1-8)

Type material. – 1 ♀ (holotype), 1 ♂ (paratype), Project Isotan-Draga I, Stn. MBT 155: 22°22' S 41°32' W, 34 m, 5 Sep 1970 (ZMA Pa. 3443).

Description. – Unlike certain other species of the



Figs. 1-8. *Eurycyde platyspina* sp. n. (♂ holotype and ♀ allotype). 1, trunk, ♀, dorsal (scale A); 2, trunk, ♀, from the left (A); 3, chelifore ♂ (B); 4, palp, ♂ (B); 5, oviger, ♂ (C); 6, compound spine 5 of oviger segment 7, ♂ (D); 7, leg 3, ♂ (A); 8, distal segments of leg 3, ♂ (B). Scales after fig. 80.

genus, the two sexes are very similar in spination, etc., even in the morphology of the oviger. Secondary sexual differences (presence of femoral cement gland tube in male, large genital pores on ventral surface of coxa 2 of all legs in female) may serve to discriminate between the sexes.

Trunk completely segmented; mid-dorsal line without tubercles. Lateral processes separated by narrow intervals, distally with low tubercle. Oviger implantation free of first lateral process. Proboscis with articulated stalk, distal part directed downward. Abdomen straight in basal part; at about 80% of its length 6 setae are implanted at bend of abdomen. Ocular tubercle cylindrical with pointed tip; eyes small, well-pigmented, touching; no setae on ocular tubercle.

Chelifore scape 2-segmented, segments subequal in length; segm. 1 with 3 long spines, segm. 2 with 7. Chela not retracted in distal end of scape; hand globular, with 1 rudimentary finger and 2 setae.

All spines (on chelifores, coxae 1 and 2, femur and tibiae 1 and 2) are of rather peculiar morphology (fig. 1, detail), viz. flattened, with more or less obtuse tip and with distal spinule, both margins with some lateral setules.

Palp segm. 1 with very strong lateral spur; segm. 2 minute; segm. 3 longest; segm. 6 shorter than 7; segms. 7 to 9 subequal, segm. 10 shorter.

Oviger segm. 4 longest; segms. 7 to 10 with 2 rows of compound spines, in longest row according to formula 6:4:4:5. Compound spines with 3 small proximal marginal teeth, then 1 large tooth, and 4 to 5 smaller distal teeth. Terminal claw short, slightly curved, smooth.

Coxa 1 with 2 long disto-dorsal spurs and 2 more proximal dorsal spines. Coxa 2 with 2 + 2 dorsal spines. Coxa 3 with minute spinules only. Femur of male with swelling at about 40% of posterior surface, bearing tube of cement gland; femur of female without such swelling; distal end of femur with 4 long spines. Tibiae 1 and 2 with several (5-7) long dorsal spines, plus some long lateral spines. Tarsus short. Propodus slightly curved, distally widening, no heel; sole with 12-14 spinules of uniform size. Claw short, curved; no auxiliary claws.

Female genital pores on distoventral surface of coxa 2 of all legs; male cement glands on femur of all legs.

Measurements (mm) of holotype: Length trunk (frontal margin cephalic segment to tip 4th lateral process) 1.71; diameter across 2nd lateral processes 1.17; length abdomen 0.58; length proboscis 1.36. Paratype, leg 3: first coxa 0.31; second coxa 0.49; third coxa 0.27; femur 1.01; first tibia 1.17; second tibia 1.17; tarsus 0.10; propodus 0.70; claw 0.23.

Etyymology. – The specific name, *platyspina*, refers to the curious shape of the spines on chelifores, abdo-

men and legs.

Remarks. – Child (1988b) has presented a key to the species of *Eurycyde*. Since the construction of this key, three more species became known: *E. antarctica* Child, 1987 (which can be traced down to couplet 7 of the key), *E. longiocularata* Müller, 1990 and *E. diacantha* Stock, 1990 (both 'strand' in couplet 3 of the key). Child (1988b: 7) remarks that *E. acanthopus* Stock, 1979 (described from a female) is probably the opposite sex of *E. curvata* Child, 1979 (described from a male). If this supposition is true, it might be useful to know which name has priority. It turned out to be almost a photofinish: *E. acanthopus* was published Sep 10, 1979, and *E. curvata* Sep 27, 1979, so the former name has priority.

Eurycyde platyspina sp. n. can be followed in Child's key to couplet 7, along with the couple *acanthopus/curvata*, *hispida* (Krøyer, 1844) and *antarctica*. It differs from *antarctica* in having long spines on the abdomen (abdomen practically glabrous in *antarctica*), and from *acanthopus/curvata* in having the abdominal spines arranged in a single dorsal group (versus scattered over the abdomen). Finally it differs from *hispida* in the presence of a tubercle on the lateral processes and 2 spurs on coxa 1 (none in *hispida*).

Nymphopsis melidae Sawaya, 1947

N. melidae Sawaya, 1947: 83-87, pls. I-II.

Material. – 1 chelate juvenile, Project Isotan-Draga I, Stn. MBT 157: 21°46'S 40°58' W, 15 m, 5 Sep 1970; 1 ♀, 2 chelate juveniles, Project Isotan-Draga I, Stn. MBT 165: 21°20' S 40°39' W, 28 m, 6 Sep 1970; 1 ♂, Project Petrobas/USP, Stn RD 54: 18°54.8'S 39°15.4' W, 41 m, 12 Aug 1972.

Remarks. – Up to now this species has been recorded only once: Sawaya (1947) described a single male from the upper littoral zone of Ilha das Palmas, Baía de Santos (ca. 24° S). The present records are more north, and from deeper shelf waters (15-41 m).

The juveniles in this collection have an unsegmented scape, the adults a 2-segmented scape. This feature, often used as a key character, should be used with some care.

Cilunculus sp.

Material. – 1 juvenile, Project Isotan-Draga I, Stn MBT 143: 24°08'S 42°28'W, 1020 m, 2 Sep 1970.

Remarks. – This juvenile has still retained its chelae, and the ovigers are an undeveloped, sausage-like structure. In most of its characters, it resembles closely *C. europaeus* Stock, 1978, from deep waters of the Bay of Biscay and the entrance of the English Channel (absence of an ocular tubercle, long setae on the legs, long auxiliary claws, absence of mid-dorsal

trunk tubercles), but it differs from *C. europaeus* in the naked lateral processes (setose in *europaeus*) and in the greater space between the anterior lateral processes (interval 3 times the diameter of the lateral process). The propodal heel bears 1 larger spine (2 in *europaeus*) and the sole bears only 6 spines, which are longer than those of *europaeus*.

I presume this specimen represents an undescribed species, but in absence of adults I refrain from naming it. The genus *Cilunculus* is new to Brazil.

Ammothella appendiculata (Dohrn, 1881)

A. appendiculata; Child 1979: 9 [refs.].

Material. – 1 ♂, usp Stn. F 23; Enseada do Flamengo, Ubatuba, State of São Paulo; intertidal of rocky shore; 13 Feb 1965; 1 ♀, Project Isotan-Druga I, Stn. MBT 165: 21°20'S 40°39'W, 28 m, 6 Sep 1970.

Remarks. – The female of Stn. MBT 165 is in agreement with the general diagnosis of this species. The male of Stn. F 23 is intermediate between *A. appendiculata* and *A. rugulosa* (vide infra), in that it has the short first scape segment of the former, but it possesses a hollow spine on the scape and spines on the lateral processes, that characterize the latter. Presumably the two species are identical.

A. appendiculata is an ampho-Atlantic species, already known from Brazil (Marcus 1940b).

Ammothella rugulosa (Verrill, 1900)

A. rugulosa; Child 1979: 11 [refs.].

Material. – 1 ♂, 1 juv., Project Isotan-Druga I, Stn. MBT 155: 22°22'S 41°32'W, 34 m, 5 Sep 1970.

Remarks. – The adult male agrees well with the characteristics presumed to characterize this species. However, in view of the large range of variation observed in *A. appendiculata* (vide supra), and in agreement with the opinion of Stock (1975a) and Child (1979), *A. rugulosa* is probably synonymous with that species.

A. rugulosa is a West Indian species, recorded before from Brazil by Marcus (1940b).

Ammothella spinifera Cole, 1904

A. spinifera Cole, 1904: 275-277, pl. 12 fig. 8, pl. 20 figs. 7-9, pl. 21 figs. 1-6; Hilton 1915: 204; Child 1979: 11-12, fig. 3f-h [older refs.]; Wicksten 1980: 198; Austin 1985: 428; Salazar-Vallejo & Stock 1987: 269; Müller & Roth 1990: fig. 4; Müller 1990b: 278.

Material. – 1 ♂ (ovig.), 1 ♂, 4 ♀, 3 juvs., usp Stn. F 10: Ponta de Santa Rita, Enseada do Flamengo, State of São Paulo; amongst ascidians, bryozoans and sponges in infralittoral zone on rocks; 13 Feb 1965.

Remarks. – The present material falls perfectly within the range of variation described by Child (1979). The species is mainly known from the Pacific (from southern California to the coast of Panamá and the Galapagos Islands). Child (1979) was the first to record it from the Caribbean coast of Panamá, and recently Müller (1990b) recorded it from Martinique and Barbados. Its range is considerably extended southward, to the coast of southern Brazil, by the present record.

Achelia besnardi Sawaya, 1951

A. besnardi; Stock 1975b: 70-71, figs. 1-9 [older refs.].

Material. – 1 ♂, Project Petrobás/usp, Stn. RD 40: 19°15.8'S 38°56.3'W, 59 m, 11 July 1972.

Remarks. – This specimen resembles closely Sawaya's (1951) good illustrations. It is a relatively rare species, having been found off Rio de Janeiro, in the Virgin Islands, and the Bahamas. There is no material available that substantiates Fry & Hedgpeth's claim (1969: 102) that the species occurs in the former Belgian Congo or (on their distribution map, fig. 155) on the South American coast as far south as 45°. Probably, these authors have confused *A. besnardi* with *A. sawayai* (vide infra) which was recorded by Fage (1949) from Zaïre.

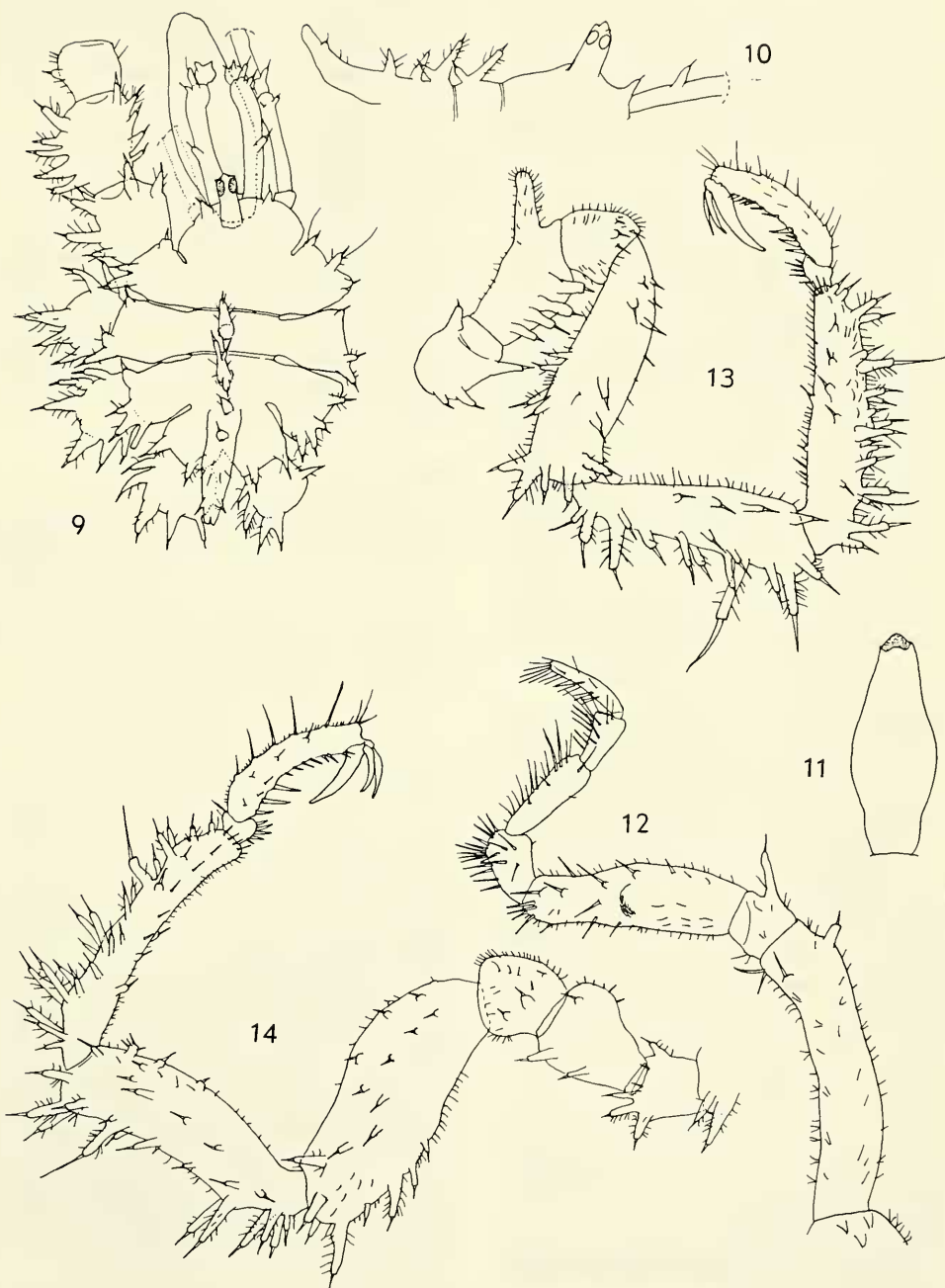
Contrary to Fry & Hedgpeth's (1969: 105) opinion, I consider this species closely related to *A. sawayai*, with which it agrees in two essential characters: (1) all spines on the propodal sole are of equal size, and (2) absence of a male genital spur.

Achelia columbaris sp. n. (figs. 9-18)

Type material. – 1 ♂ (ovig.), holotype and 3 ♀ paratypes, Project Isotan-Druga I, Stn. MBT 155: 22°22'S 41°32'W, 34 m, 5 Sep 1970 (ZMA Pa. 3444).

Description. – Male: Trunk compact, hardly any space between lateral processes. Trunk segments 1, 2, and 3 separated by articulation lines, segments 3 and 4 fused. Trunk segments 2 and 3 with bifid mid-dorsal spur (anterior branch longer than posterior one), tipped with spinules. Trunk segment 4 and proximal end of abdomen with lower, simple mid-dorsal spur. Anterior margin of cephalic segment with pointed tubercle on either corner. Ocular tubercle with 2 minute lateral knobs and small distal knob; eyes small, pigmented. Lateral processes with spiniferous spurs, some bifid or trifid at tip.

Proboscis of type C (greatest width at less than mid-length, distal part tapering). Abdomen reaching to distal end of coxa 1 of leg 4, slightly upcurved; apart from dorsal spur in basal part, it bears 2 lateral



Figs. 9-14. *Achelia columnaris* sp. n. (♂ holotype and ♀ paratype). 9, trunk, ♂, dorsal (scale A); 10, contour of dorsum, ♂, from the right (A); 11, proboscis, ♂, ventral (A); 12, palp, ♀ (B); 13, leg 3, ♂ (A), 14, leg 3, ♀ (A). Scales after fig. 80.

spiniferous tubercles near distal end.

Chelifore scape with 1 tall mediolateral spur, and 2 distolateral spurs of unequal length. Chela with 2 pointed processes (rudiments of fingers).

Palp 8-segmented; basal segments covered with short spinules; segm. 2 with distolateral spiniferous process; a much taller, pillar-shaped process present on distolateral corner of segm. 3. Segm. 2 > 4; segm. 5 < 6; 6 > 7; 7 < 8. Distal segm. slender, with ventral brush of setae.

Oviger segms. 4 and 5 subequal, with recurved row of spinules. Segm. 6 with strong, reversed spine in basal part, and several other, smaller, reversed spinules. Compound spines elongate, with some 8 pairs of marginal teeth; formula 2:2:1:2.

Legs: Coxa 1 with 1 or 2 tall spiniferous spurs on anterior margin, 2 on posterior margin, and 2 or 3 on distal margin. Coxa 2 with 3 or 4 tall spurs on anterior and posterior margins. Coxa 3 with 1 or 2 spiniferous tubercles. Femur with numerous spiniferous processes on posterior and dorsal surface, taller towards distal end. Tibia 1 with many very tall, pillar-shaped, spiniferous spurs on dorsal and posterior surface, tibia 2 with still more numerous, but slightly less tall such spurs. Tarsus short, with 4 or 5 ventral spines. Propodus slightly curved, heel with 3 or 4 large spines; sole with some 7 smaller spines. Auxiliary claws more than half as long as main claw. Genital spur long, thump-shaped, on ventrodiscal corner of coxa 2 of legs 3 and 4.

Female: Mid-dorsal trunk tubercles simple (not bifid); tubercle over base of abdomen lacking. Spurs on lateral processes and legs as tall as in male, but coxa 1 without marginal spurs (only with distal spurs, occasionally with 1 small posterior spur). Coxa 2 with 1 pair of marginal spurs and 1 pair of distal spurs. Femur more swollen than in male. Genital apertures on ventral surface of coxa 2 of all legs.

Measurements (mm) of male (those of female in parentheses). – Length proboscis (ventral) 1.10 (1.15); greatest diameter proboscis 0.44 (0.43); length trunk (to tip 4th lateral process) 1.30 (1.26); width across 2nd lateral processes 1.16 (0.94); length abdomen 0.59 (0.59); length scape 0.57 (0.67); diameter egg on male oviger 0.15.

Leg 3: first coxa 0.46 (0.34); second coxa 0.50 (0.57); third coxa 0.34 (0.38); femur 1.177 (1.37); first tibia 1.27 (1.39); second tibia 1.31 (1.46); tarsus 0.13 (0.11); propodus 0.71 (0.74); claw 0.39 (0.40); auxiliary claw 0.23 (0.28).

Etymology. – The proposed specific name, *columnaris* (Latin, pillar-shaped) alludes to the shape of the spurs on femur and tibiae.

Remarks. – The new species shows, by the presence of a row of mid-dorsal trunk tubercles, a strong similarity to the *Achelia assimilis/wilsoni/variabilis* com-

plex (see Hedgpeth 1961), frequently recorded from the major oceans of the southern hemisphere. However, none of the recorded 'variations' has tall, pillar-shaped spurs on femur and tibiae. Similar tall spurs are present on palp segments 2 and 3 of the new species, whereas in the *A. assimilis* group just a tubercle is present.

The very strong armature of the legs is not unlike that found in *A. setulosa* (Loman, 1912), but that species lacks mid-dorsal trunk and palp spurs, and has a less slender distal palp segment.

Other very spinose *Achelia* species from the central Atlantic Ocean are *A. turba* Stock, 1990 (which has however no mid-dorsal trunk spurs, shorter spurs on the long leg segments, a shorter male genital spur, and a less pointed proboscis), and *A. armata* (Bouvier, 1916) (which lacks spurs on the long leg segments or in the mid-dorsal line and has less elongate femur, tibiae 1 and 2, and propodus).

Achelia gracilis Verrill, 1900

A. gracilis, Hedgpeth 1948: 244, fig. 38 f-g [older refs.]; Stock 1954: 117; Stock 1979: 10; Stock 1986: 416; Zambrana et al. 1985: 30 [refs.]; Markham 1986: 276, fig. 87.

Material. – 1 ♂, Project Petrobas/USP, Stn. RD 50: 19°02.5'S 39°30.6'W, 28 m, 12 July 1972.

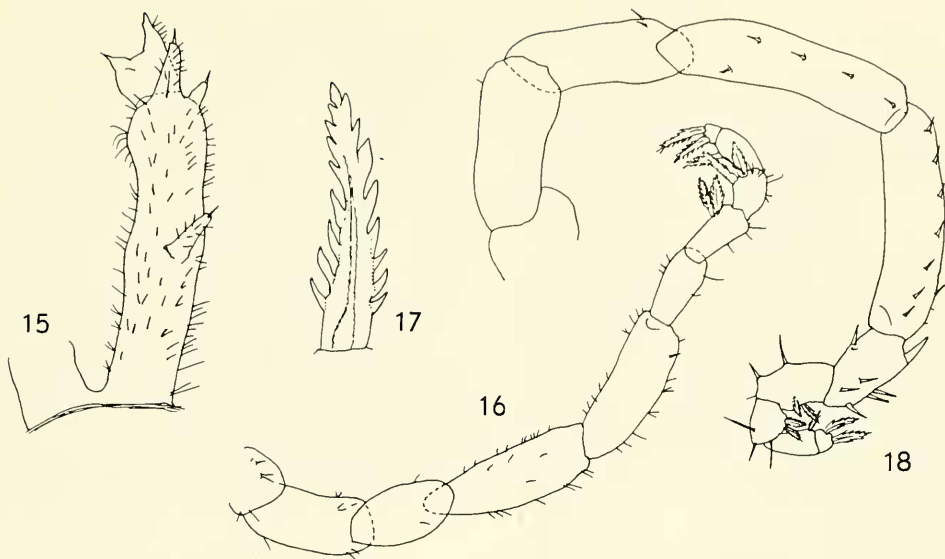
Remarks. – This species was known from Bermuda to the West Indies. It is new to the fauna of Brazil.

Achelia sawayai Marcus, 1940

A. sawayai, Krapp & Kraeuter 1976: 342-343 [older refs.]; Stock 1986: 414-416 [older refs.]; Stock 1989: 87-89; Müller 1989: 124; Müller 1990a: 105-106; Müller 1990b: 277; Stock 1990: 218-219.

Material. – 64 spms., USP Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds of rocky shore, infralittoral, 20 Nov 1964; 3 ♂, 6 ♀, 25 juvs., USP Stn. F 23: Enseada do Flamengo, Ubatuba, State of São Paulo; infralittoral, on large boulders, amongst ascidians, bryozoans, sponges, 13 Feb 1965; 1 ♀, 1 juv., USP Stn. F 10: Ponta de Santa Rita, Enseada do Flamengo, Ubatuba, State of São Paulo; intertidal, rocky shore, on *Dyctiota* sp., 12 Dec 1965; 1 ♂ ovig., 1 ♂, 1 ♀, Project Isotan-Draga I (PID) Stn. MBT 152: 23°03'S 41°10'W, 98 m, 4 Sep 1970; 1 juv., PID Stn. MBT 159: 22°00'S 40°06'W, 90 m, 5 Sep 1970; 1 juv., PID Stn. MBT 161: 21°42'S 40°15'W, 56 m, 6 Sep 1970; 2 ♂, 1 ♀, 5 juv., PID Stn. MBT 164: 21°15'S 40°50'W, 19 m, 6 Sep 1970; 1 ♂ ovig., Project Petrobas/USP, Stn. RD 54: 18°54.8'S 39°15.4'W, 41 m, 12 July 1972; 1 ♂, 1 ♀, 1 juv., Project Petrobas/USP, Stn. RD 56: 18°54.7'S 38°53.5'W, 38 m, 12 July 1972.

Remarks. – Originally described from Brazil, the species is now recorded from all over the West Indies, the Gulf of Mexico, the American east coast as far north as Georgia, the Cape Verde Islands, Mauritania



Figs. 15-18. *Achelia columnaris* sp. n. (♂ holotype and ♀ paratype). 15, chelifore, ♀ (scale B); 16, oviger, ♀ (B); 17, compound spine of oviger segment 10 (free-hand sketch); 18, oviger, ♂ (B). Scales after fig. 80.

(unpubl. record based on material in the Museum Gr. Antipa, Bucarest), Zaïre, Madagascar, and the Society Islands.

Tanystylum acuminatum Stock, 1954
(figs. 19-21)

T. acuminatum Stock, 1954: 125-127, fig. 29; Stock 1979: 11; Müller 1990b: 278.

Material. – 15 spms. (incl. ovigerous males), USP Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds growing in the infralittoral of rocky shore, 20 Nov 1964; 1 ♀, USP Stn F 27: Rocky shore between Praia do Dionisio and Praia do Flamengo, Enseada do Flamengo, Ubatuba, State of São Paulo, on algae at low tide, 15 Feb 1965; 1 ♀, USP Stn F 10: Ponta Santa Rita, Enseada do Flamengo, Ubatuba, State of São Paulo, intertidal of rocky shore, on *Dyctiota* sp., 12 Dec 1965; 1 ♀, Project Isotan-Draga I, Stn. MBT 157: 21°46'S 40°58'W, 15 m, 5 Sep 1970.

Remarks. – The male has never been described before. It resembles the female in almost every character, except for the tuberculation of coxa 1, which is slightly stronger in the male, and of course the structure of the oviger. The male oviger has an ecto-distal apophysis on segment 7, which places *T. acuminatum* in a group of species comprising *T. tubirostrum* Stock, 1954, *T. dowi* Child, 1979, *T. oculospinosum* Hilton, 1942, *T. isthmiacum* Stock, 1955, and *T. isabellae* Marcus, 1940.

T. acuminatum is new to Brazil; it was previously known from the Lesser Antilles only (St. Barts,

Anguilla, Martinique).

Tanystylum evelinae Marcus, 1940

T. evelinae Marcus, 1940b: 99-102, fig. 13.

Material. – 1 ♂ ovig., USP Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds growing on rocky shore, infralittoral, 20 Nov 1964.

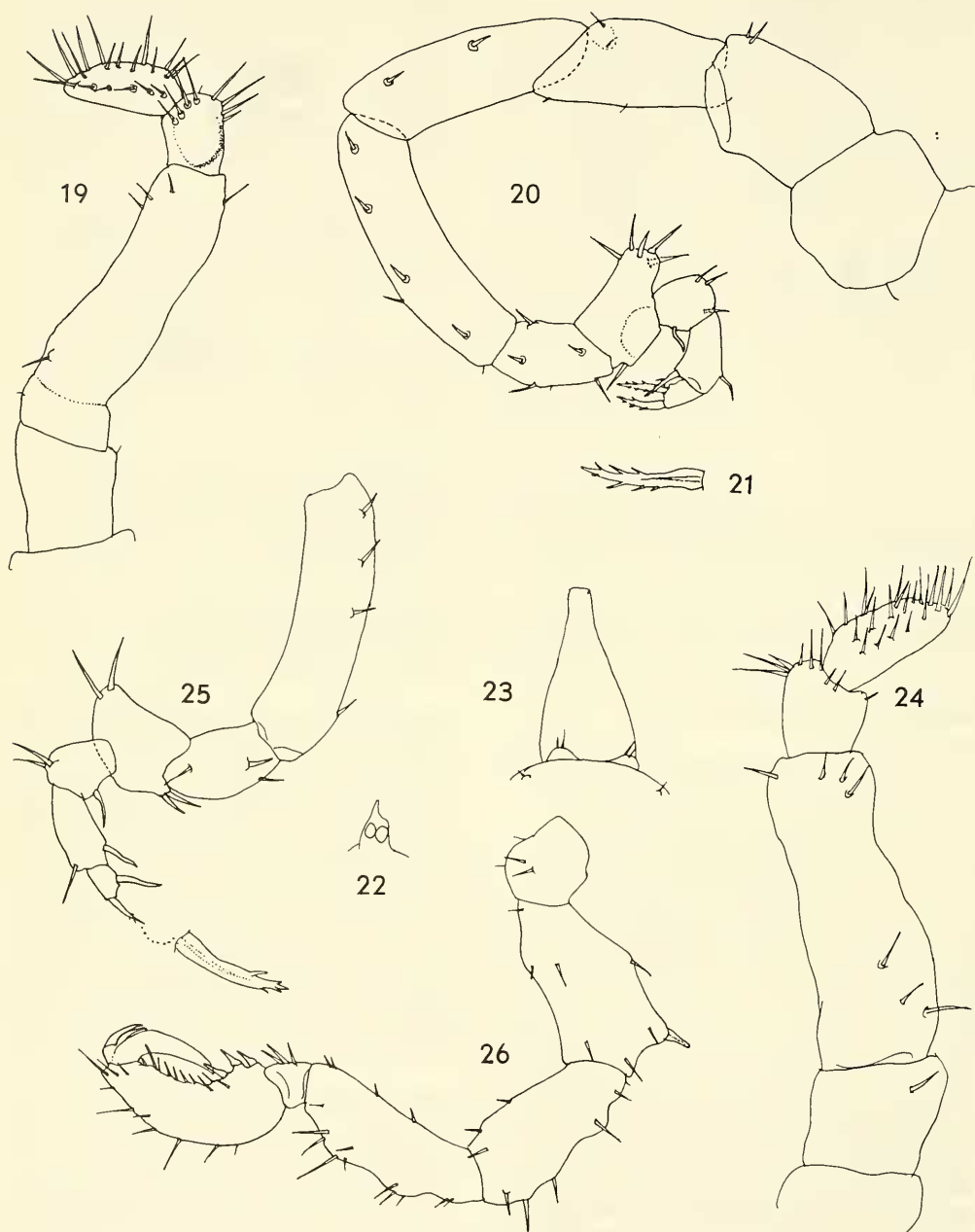
Remarks. – The single specimen is badly damaged, but is probably this species. *T. evelinae* was already found in the same general area by Marcus (1940b), but was never recorded again. As point of fact it resembles strongly *T. haswelli* Child, 1990, an Australian form. The palps of *haswelli* are 4-segmented, those of the types of *evelinae* 6-segmented, but in the present specimen, articulation lines in the basal part of the palp are obscure, resulting in a 4-segmented appearance of the appendage.

Tanystylum isabellae Marcus, 1940
(figs. 22-26)

T. isabellae Marcus, 1940b: 95, 102-105, fig. 14; Page 1949: 29, fig. 5.

Material. – 1 ♂, 3 juvs., USP Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds growing on rocky shore, infralittoral, 20 Nov 1964.

Remarks. – The types come from the same area and the same depth. Page (1949) records it moreover from Zaïre.



Figs. 19-21. *Tanystylum acuminatum* Stock, 1954 (♂ from Stn. usp/P.E.). 19, palp (scale E); 20, oviger (E); 21, spine 1 of oviger segment 10 (free-hand sketch).

Figs. 22-26. *Tanystylum isabellae* Marcus, 1940 (♂ from Stn. usp/P.E.). 22, ocular tubercle from the left (free-hand sketch); 23, proboscis and chelifores (A); 24, palp (E); 25 distal part of oviger (E); 26, leg 2 (B). Scales after fig. 80.

Some new illustrations are incorporated here, mainly to show the shape of the proboscis. The penultimate palp segment is slightly less lobate than Marcus' figure 14E suggests, but it is in good agreement with Fage's fig. 5.

This species is strikingly similar to *T. oculospinosum* Hilton, 1942 (vide Child & Hedgpeth 1971: 619, fig. 5, and Child 1979: 34), a Pacific species ranging from Baja California to the Galapagos Islands. The only difference seems to be the second tibia which looks shorter in Child & Hedgpeth's fig. 5c. I suppose, however, that both species are synonymous, in which case Marcus' name has priority. Child (1979) records another *Tanystylum*, *T. tubirostrum* Stock, 1954 and several other species of Pycnogonida from both the Atlantic and the Pacific side of the Americas, so from a biogeographic point of view it would not be too surprising if the Pacific *T. oculospinosum* and the Atlantic *T. isabellae* were synonymous.

Tanystylum isthmiacum difficile Stock, 1966

T. isthmiacum difficile Stock, 1966: 389-390, fig. 2 a-h; Fage & Stock 1966: 318; Stock 1975a: 984; Child 1979: 29-30; Stock 1979: 11-13, fig. 3 b-f; Zambrana et al. 1985: 31 [refs.].

Material. – 1 juv., Project Petrobas/USP, Stn. RD 50: 19°02.5'S 39°30.6'W, 28 m, 12 July 1972.

Remarks. – This young specimen, with still poorly developed ovigers, agrees well with the published descriptions of this (sub)species. It was already known from the same general depth in the same area (Stock 1966).

Tanystylum orbiculare Wilson, 1878

T. orbiculare, Krapp 1973: 69, fig. 4; Child 1990: 319, fig. 3 [holotype re-illustrated].

Material. – 5 spms., USP Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds of intertidal zone of rocky shore, 20 Nov 1964; 1 ♀, USP Stn. F 27: Rocky shore between Praia do Dionisio and Praia do Flamengo, Enseada do Flamengo, Ubatuba, State of São Paulo, on algae slightly exposed at low tide, 15 Feb 1965.

Remarks. – The proboscis shape resembles Marcus (1940b) figure rather than Krapp's (1973) illustration. The female oviger is 10-segmented (versus 9-segmented in the closely similar *T. conirostre*) and the propodal armature is as Krapp describes for *T. orbiculare*. The abdomen too, resembles Marcus fig. 15A, instead of Child's (1990) fig. 3 A-B. Perhaps this is not *orbiculare* at all, but another look-alike in this difficult genus.

Family Nymphonidae

Nymphon bullatum sp. n. (figs. 27-34, 47-51)

Type material. – 1 ♂ (holotype), 8 ♂ (of which 1 ovigerous), 6 ♀, 25 juvs. and larvae (paratypes), Project Isotan-Draga 1 (PID), Stn. MBT 149: 23°41'S 41°55'W, 250 m, 4 Sep 1970 (ZMA Pa. 3446).

Other material. – 1 juv., PID, Stn. MBT 153: 22°48'S 41°14'W, 65 m, 4 Sep 1970; 1 ♂ (fragm.), PID, Stn. MBT 181: 25°35'S 46°03'W, 136 m, 29 May 1971.

Description. – Trunk completely segmented, unadorned. Lateral processes narrow, separated by intervals distinctly larger than their own diameter. Neck strongly widened in anterior end; narrow, parallel-sided portion just in front of oviger implantation; latter practically in contact with first lateral process. Ocular tubercle truncate in frontal view, with 2 minute distolateral tubercles; in side view as illustrated; eyes well-pigmented. Proboscis almost cylindrical. Abdomen reaching to distal end of coxa 1 of leg 4.

Chelifore scape thin, longer than proboscis, armed with some setules in middle and at distal end. Chela much shorter than scape; palm much shorter than fingers; both fingers curved; movable finger with 19 regular teeth, immovable finger with 14.

Palp segm. 2 longest; segm. 3 ca. two-thirds of segm. 2; segm. 4 distinctly shorter than segm. 5; long setae on segms. 3 to 5.

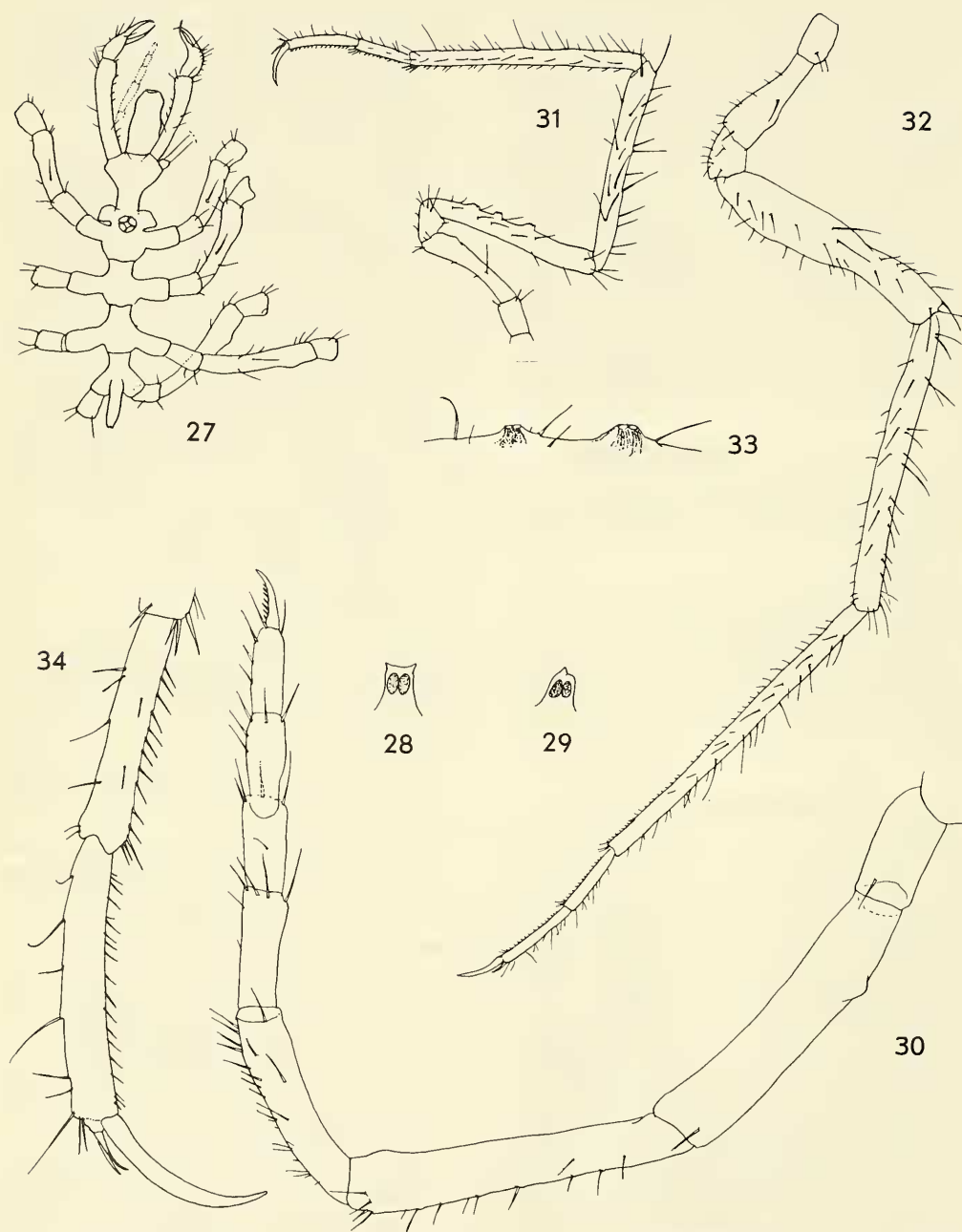
Oviger of male highly characteristic: segm. 5 longest, somewhat S-shaped, with strong apophysis at two-thirds of its endal margin; segm. 6 curved, setiferous. Compound spine formula 7:4:3:4; compound spines with 2 or 3 pairs of marginal teeth. Distal claw with 7 endal teeth.

Oviger of female: segm. 5 hardly longer than segm. 4, straight. Compound spine formula 6:5:4:4. Distal claw with 6 endal teeth.

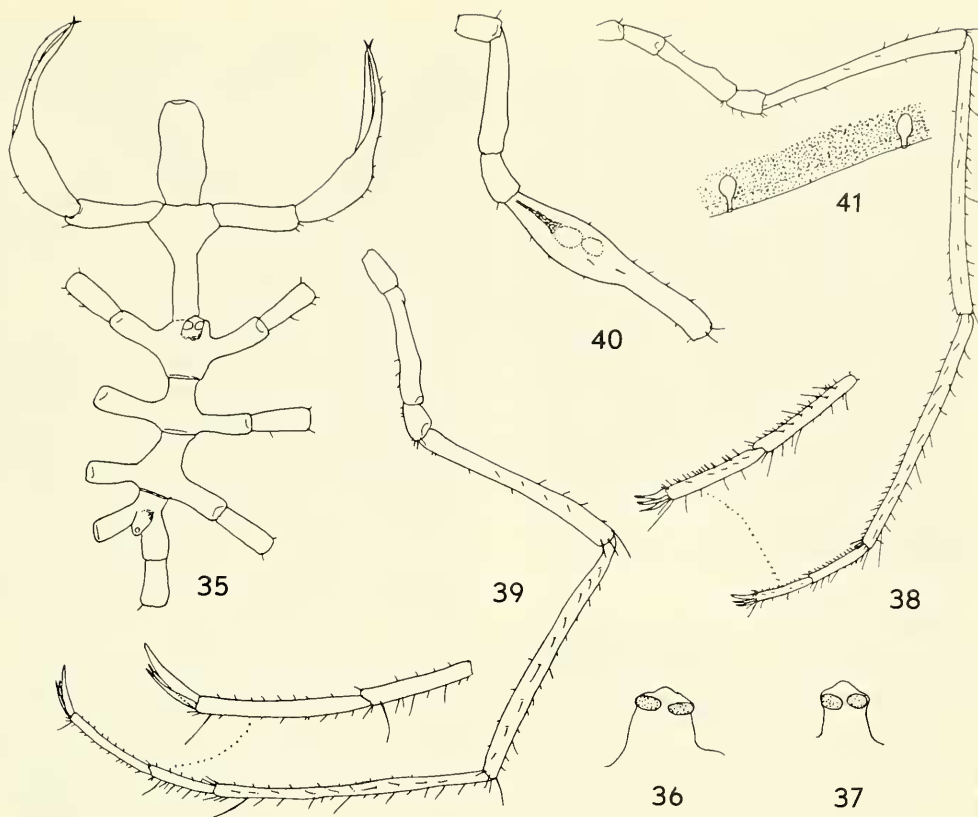
Legs thin, slender. Coxa 2 shortest in leg 1, longest in legs 3 and 4; very slender in posterior legs. Femur < tibia 1 < tibia 2. Femur of male with 3 ventral cement gland apertures, shaped as truncate cones. Femur of female: basal two-thirds swollen (containing eggs). All long leg segments with many setae, mostly about as long as segment diameter. Tarsus slightly shorter than propodus; both segments with row of small spinules of uniform size on ventral margin; no heel or heel spines differentiated. Claw curved, about 60% of length of propodus; auxiliary claws feeble, about 30% of length of claw.

Measurements of ♂ holotype (mm). – Length proboscis (dorsal) 1.04; greatest diameter proboscis 0.45; greatest diameter crop 0.91; length first trunk segm. 1.61; length second trunk segm. 0.80; length third trunk segm. 0.78; length fourth trunk segm. (to tip abdomen) 1.24; width across second lateral processes 1.57; length scape 1.41; length chela 0.91.

Leg 3: first coxa 0.63; second coxa 1.92; third coxa



Figs. 27-34. *Nymphon bullatum* sp. n. (from Stn. MBT 149). 27, trunk, ♂ (scale F); 28, ocular tubercle, ♀ (free-hand sketch); 29, ocular tubercle, ♀, from the left (free-hand sketch); 30, oviger, ♀ (B); 31, leg 3, ♂ (F); 32, leg 3, ♀ (F); 33, cement gland apertures of leg 3, ♂ (B); 34, distal segments of leg 3, ♂ (B). Scales after fig. 80.



Figs. 35-41. *Nymphon inaequipes* sp. n. (from Stn. MBT 142). 35, trunk, ♀, dorsal (scale F); 36 ocular tubercle, ♀, from the left (free-hand sketch); 37 ocular tubercle, ♀, frontal (free-hand sketch); 38, leg 1, ♂ (F); 39, leg 3, ♂ (F); 40, leg 4, ♀ (F); 41, cement gland apertures of leg 1, ♂ (free-hand sketch). Scales after fig. 80.

0.43; femur 2.74; first tibia 3.59; second tibia 4.05; tarsus 0.95; propodus 1.07; claw 0.58; auxiliary claws 0.15.

Etymology. – The specific name is derived from *bulla* (Latin = knob, bump) and alludes to the apophysis on oviger segment 5 in the male.

Remarks. – Two outstanding features of the male differentiate this species from the 200-odd others in the genus: (1) the cement glands discharging through volcano-shaped prominences; and above all (2) the apophysis on oviger segment 5 which is not apical (as in many other *Nymphon* species) but localized at two-thirds of the segment.

Cement gland apertures similar to those of the new species are known from two other species only: *N. discorsicoxae* Child, 1982 and *N. caldarium* Stock, 1988. The former, however, is a brevitarsal species (whereas *N. bullatum* is longitarsal) and the latter is uniungiculate (whereas *N. bullatum* possesses auxiliary claws).

Morphologically closest to *N. bullatum* are perhaps *N. sandersi* Child, 1982 (from off Rio de la Plata, Argentina, 3815-4435 m) and *N. longicollum* Hoek, 1881 (off Valparaíso, Chile, 2225 fms = 4072 m). Since some of the most useful diagnostic characters in the genus *Nymphon* are sex-linked (male oviger and male cement glands), it is hard to judge about the relationships of these two species, of which the (adult) male is unknown. Both differ from *N. bullatum* in that the auxiliary claws are tiny or lacking, and the ocular tubercle is slender and conical, without eyes. Some additional differences between *N. sandersi* and *N. bullatum* are: (1) palp segm. 2 = 3 in *sandersi*, 2 > 3 in *bullatum*; (2) oviger claw with 3 teeth in *sandersi*, 6-7 in *bullatum*; (3) compound oviger spines with 5 pairs of teeth in *sandersi*, 2-3 in *bullatum*. In *N. longicollum* (vide Gordon 1932a) the chela is straighter and the palm is longer than in *N. bullatum*, and each finger bears 11-12 teeth only (14-19 in *bullatum*).

Nymphon inaequipes sp. n.
(figs. 35-46)

Type material. – 1 ♂ holotype, 1 ♀ allotype, 23 paratypes, Project Isotan-Draga 1 (PID), Stn. MBT 142: 23°46'S 43°00'W, 150 m, 2 Sep 1970 (ZMA Pa. 3445).

Other material. – 1 ♀, PID, Stn. MBT 94: 25°56'S 46°42'W, 124 m, 18 June 1970; 2 ♀, PID, Stn. MBT 139: 30°52'S 49°51'W, 126 m, 27 June 1970; 1 ♀, PID, Stn. MBT 148: 23°19'S 41°57'W, 136 m, 3 Sep 1970; 7 spms., PID, Stn. MBT 151: 23°36'S 41°23'W, 475 m, 4 Sep 1970; 1 ♀, PID, Stn. MBT 152: 23°03'S 41°10'W, 98 m, 4 Sep 1970; 2 ♂, 1 ♀, PID, Stn. MBT 194: 24°27'S 44°57'W, 26 m, 1 June 1971; 1 ♂, 2 juvs., PID, Stn. MBT 195: 24°03'S 44°59'W, 73 m, 1 June 1971; 1 ♂, 1 ♀, PID, Stn. MBT 196: 23°31'S 44°57'W, 38 m, 1 June 1971; 208 spms., PID, Stn. MBT 197: 23°47'S 44°44'W, 65 m, 1 June 1971; 5 spms., PID, Stn. MBT 198: 24°03'S 44°30'W, 124 m, 2 June 1971; 47 spms., PID, Stn. MBT 206: 23°14'S 44°03'W, 52 m, 3 June 1971; 4 spms., PID, Stn. MBT 208: 23°20'S 43°26'W, 78 m, 4 June 1971; 34 spms., PID, Stn. MBT 211: 23°59'S 43°01'W, 220 m, 4 June 1971; 1 ♀, R. V. 'Prof. W. Besnard', Stn. RIG 591: 24°27'S 44°00'W, 500 m, 8 Feb 1969; 2 juv., R. V. 'Prof. W. Besnard', Stn. RIG 1330: 23°13'S 44°06'W, 40 m, 16 Feb 1968.

Description. – Trunk completely segmented, naked. Lateral processes long, slender, separated by intervals more than twice as wide as diameter of each lateral process. Neck widened at anterior end, followed by long, narrow, parallel-sided part. Oviger implantation in contact with anterior margin of first lateral process; on dorsal side of neck, right and left implantations fused (looking like segmentation line, but such line absent on ventral surface of neck). Ocular tubercle mainly cylindrical, rather low; rounded point at distal end; eyes small, well-pigmented. Abdomen short (in dorsal view not extending beyond 4th lateral processes), directed obliquely upward and backward (angle with horizontal ca. 75°).

Proboscis swollen at basal third, and again at distal third, shorter than neck.

Chelifere scapes strongly diverging, practically unarmed. Chela much longer than scape. Fingers longer than palm, curved near tip. Each finger with numerous (ca. 55) unequal teeth: a larger tooth is alternating with 2 to 4 smaller teeth (some of the smaller teeth bifid); larger teeth of movable finger shorter and more obtuse, on immovable finger larger and pointed. In juveniles, number of teeth on fingers lower.

Palp segms. 2 to 5 very slender, in proportions 9:7:8:6. Long setae in particular on segms. 4 and 5.

Oviger of male: Segm. 5 almost straight, by far longer than segm. 4, with row of recurved spinules on ventral margin and with small distal apophysis. Segm. 6 curved, about one-third of length of segm. 5, with inconspicuous tubercle on dorsal margin. Compound spines, according to formula 8:6:6:6, with 3 large basal teeth and 3 much smaller distal teeth on either margin. Distal claw long, slender, with 7 teeth.

Oviger of female: Much weaker than that of male, segm. 5 not so much longer than segm. 4, straight, without recurved spinules. Segm. 6 straight. Spine formula 10:7:6:8::10.

Legs long and thin. Coxae almost naked; coxa 2 of leg 1 less elongate than that of P2-P4. Femur < tibia 1; tibia 2 slightly longer than tibia 1. Several rather short setae, in particular on tibiae. Leg 1 having distal segms. different from those of other legs (heteropody); in leg 1 tarsus > propodus, both densely set with small spinules of uniform size on ventral surface; claw of leg 1 short (ca. 25% of length of propodus); auxiliary claws almost 90% of length of main claw. In remaining legs, tarsus < propodus, sparsely armed with small spinules; claw long (about 50% of length of propodus); auxiliary claws about 80% of length of main claw. Heteropody already visible in juveniles. Femur of female strongly swollen in basal half, for conception of eggs. Femoral gland pores in male inconspicuous; a bulbous, subcutaneous vesicle opens through a longish, narrow, subcutaneous duct into a minute pore; 8 or 9 glands present on each leg. Sexual openings of female on distoventral end of coxa 2 of all legs.

Measurements (mm) of female from Stn. MBT 142. – Length proboscis (dorsal) 0.93; greatest diameter proboscis 0.45; length first trunk segm. 1.47; length second trunk segm. 0.51; length third trunk segm. 0.53; length fourth trunk segm. (to tip fourth lateral process) 0.59; width across second lateral processes 1.40; length scape 0.72; length chela 1.63. First leg: tarsus 0.71; propodus 0.64; claw 0.16; auxiliary claws 0.14. Third leg: first coxa 0.33; second coxa 1.40; third coxa 0.39; femur 2.03; first tibia 2.77; second tibia 2.85; tarsus 0.64; propodus 0.96; claw 0.49; auxiliary claws 0.40.

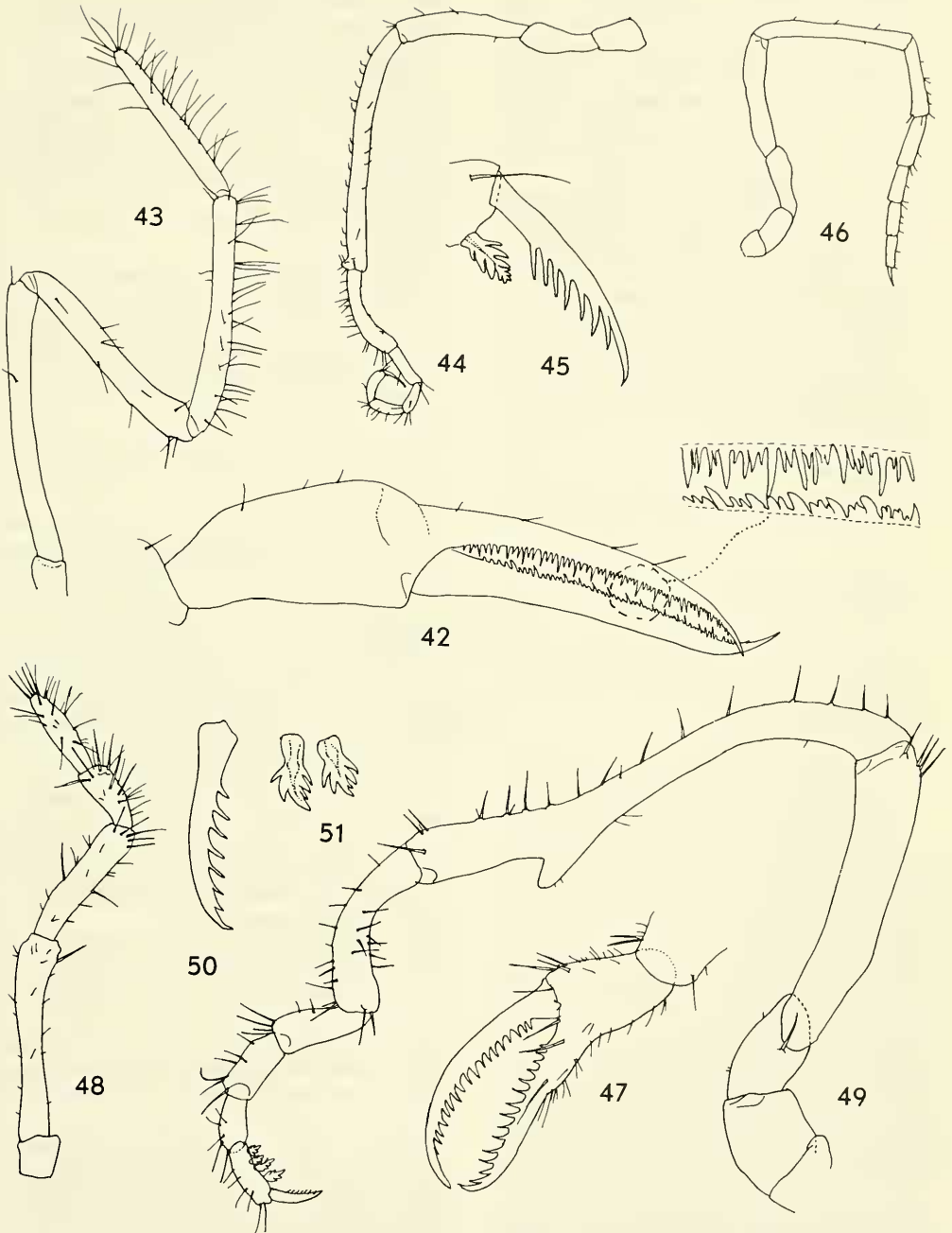
Etymology. – The specific name, *inaequipes* (Latin, with unequal legs) alludes to the morphological differences between leg 1 and the remaining legs.

Distribution. – This is a rather common, sometimes even abundant species in our samples. It has been found in depths between 26 and 500 m.

Remarks. – The present species is rather similar to the next, *N. vulcanellum*. Look-alikes must be sought amongst such taxa as *N. macrum* Wilson, 1880, *N. gracillimum* Calman, 1915, and *N. hiemale* Hodgson, 1907.

N. inaequipes differs from these as follows:

– From *N. vulcanellum* by the cement gland apertures which are flush with the femoral surface (not raised), the fingers of the chela which bears >50 teeth of unequal size (versus <26 teeth of uniform size), the longer auxiliary claws, and the heteropodous nature of the legs. In mixed collections of *N. vulcanellum* and *N. inaequipes*, which are common, the latter can be distinguished at first glance by its smaller size,



Figs. 42-46. *Nymphon inaequipes* sp. n. (from Stn. MBT 142). 42, chela, ♂ (scale B); 43, palp, ♂ (B); 44, oviger, ♂ (A); 45, distal part of oviger, ♂ (G); 46, oviger, ♀ (A).

Figs. 47-51. *Nymphon bullatum* sp. n., ♂, from Stn. MBT 149. 47, chela (scale B); 48, palp (B); 49, oviger (B); 50, oviger claw (free-hand sketch); 51, compound spines of oviger segment 10 (free-hand sketch). Scales after fig. 80.

longer neck, and shorter, erect abdomen.

– From North Atlantic *N. macrum* by the second tibia which is hardly longer than the first (versus 1.3 to 1.5 times as long as tibia 1), the oviger implantation which is in contact with the first lateral process (well in front of it in *N. macrum*), the number of compound oviger spines, viz. a total of 25-31 (versus > 60 in *macrum*), and the number of teeth on the oviger claw (<11, versus ca. 19 in *macrum*).

– From *N. gracillimum* and *N. hiemale* (which might be synonymous, see Gordon, 1932b: 42), from cold to polar waters of the Southern Hemisphere, by the presence of a distal apophysis (though small) on oviger segment 5 of the male in *inaequipes*, the propodal armature (sole with uniform spinules in *inaequipes*, versus unequal in the other two), the subequal tibiae of *inaequipes* (versus second tibia 1.4-1.5 times as long as the first), the higher number of teeth on the fingers of the chela (>50 versus <36), and the longer auxiliary claws.

In none of these species heteropody is recorded. In fact, this is a rather rare phenomenon, more usually found in unrelated genera, such as *Ascorhynchus*.

Nymphon vulcanellum sp. n. (figs. 52-61)

Nymphon spec.; Stock 1966: 392-393, fig. 3a-d.

Type material. – 1 ♂ (ovig.) holotype, 1 ♀ allotype, 9 ♂ (partly ovig.), 2 ♀, 39 juvs and larvae (paratypes), Project Isotan Draga I (PID), Stn. MBT 148: 23°19'S 41°57'W, 136 m, 3 Sep 1070 (ZMA Pa. 3447).

Other material. – 14 larvae (probably this species), PID, Stn. MBT 111: 27°22'S 47°27'W, 140 m, 21 June 1970; 1 ♀, PID, Stn. MBT 116: 27°59'S 47°31'W, 150 m, 22 June 1970; 1 juv., 2 larvae, PID, Stn. MBT 141: 23°25'S 43°00'W, 113 m, 2 Sep 1970; 3 ♀, 19 juvs. & larvae, PID, Stn. MBT 142: 23°46'S 43°00'W, 150 m, 2 Sep 1970; 1 ♂ (ovig.), 2 ♀, 3 juvs., PID, Stn. MBT 145: 23°25'S 42°27'W, 130 m, 3 Sep 1970; 1 ♂, 9 larvae, PID, Stn. MBT 149: 23°41'S 41°55'W, 250 m, 4 Sep 1970; 1 juv., PID, Stn. MBT 152: 23°03'S 41°10'W, 98 m, 4 Sep 1970; 5 larvae, PID, Stn. MBT 156: 22°06'S 40°53'W, 32 m, 5 Sep 1970; 30 juvs. & larvae, PID, Stn. MBT 161: 21°42'S 40°15'W, 56 m, 6 Sep 1970; 1 spm. (fragm.), PID, Stn. MBT 173: 25°32'S 47°11'W, 55 m, 27 May 1971; 1 juv., PID, Stn. MBT 195: 24°03'S 44°59'W, 73 m, 1 June 1971; 2 ♀, PID, Stn. MBT 197: 23°47'S 44°44'W, 65 m, 1 June 1971; 1 larva, PID, Stn. MBT 210: 23°46'S 43°10'W, 128 m, 4 June 1971; 4 juvs., PID, Stn. MBT 211: 23°59'S 43°01'W, 220 m, 4 June 1971; 1 ♀, R. V. 'Prof. W. Besnard' Stn. 1490: 22°08'S 41°00'W, 21 m, 12 Mar 1971.

Description. – Trunk completely segmented, practically unarmed. Lateral processes > diameter trunk, intervals slightly larger than diameter of lateral process. Anterior part of neck strongly widened; short parallel-sided basal part. Ocular tubercle truncate, with 2 minute lateral, and 1 terminal tubercle; eyes

present. Oviger implantation in contact with anterior margin of first lateral process. Abdomen long, reaching beyond middle of coxa 1 of leg 4, almost horizontal. Proboscis barrel-shaped, short.

Chelifore scapes strongly divergent, poorly armed. Chela longer than scape. Fingers not in same plane as palm, longer than palm. Movable finger curved at tip, immovable finger regularly curved; each finger with 20-25 teeth, those of immovable finger longer than those of movable finger.

Palp segm. 2 > 3 > 4 > 5; segms. 3 and 4 unusually slender.

Oviger of male: Segm. 5 >> 4, somewhat S-shaped, distally swollen. Segm. 6 most remarkable, because showing a subdivision into 2 segments (segmentation more or less distinct, sometimes looking functional, see arrow in fig. 58). Compound spines with 3, rarely 4, marginal teeth; formula 12:8:6:6. Claw with 6 teeth.

Oviger of female: Segm. 5 straight, slightly longer than 4; segm. 6 not subdivided. Spine formula 5:6:6:7::5.

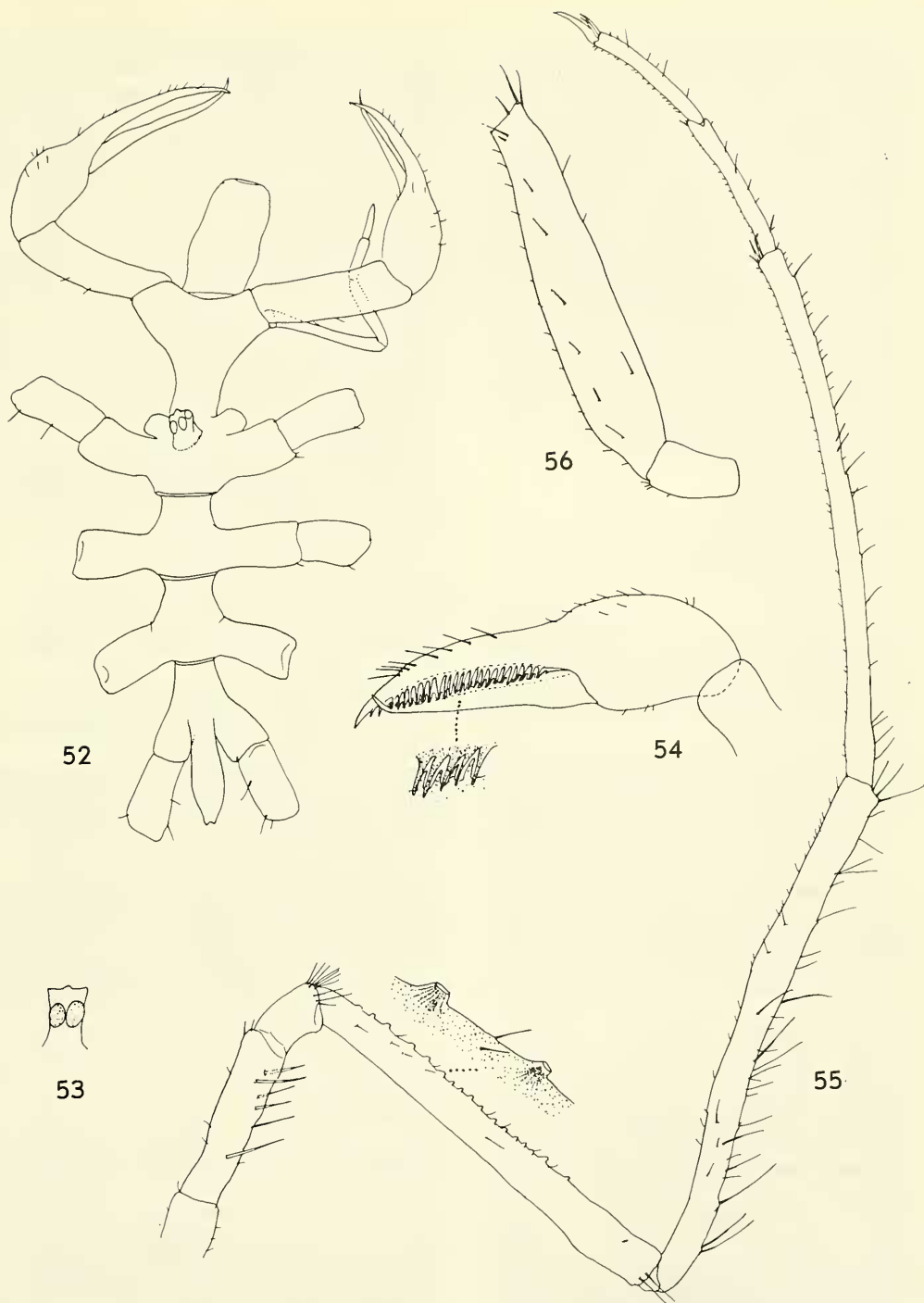
Legs: Femur of female slightly swollen in proximal part. Femur of male with some 16 cement gland apertures on ventral margin of all legs. Apertures shaped like low, truncate volcanoes. Coxa 2 and both tibiae with some long setae. Femur < tibia 1; tibia 1 slightly longer than tibia 2. Tarsus slightly longer than propodus; ventral margin of tarsus and propodus densely packed with minute spinules of uniform size (no heel, no heel spines). Claw short; auxiliary claws about half length of main claw. Legs homoiopodous.

Measurements of ♀ from Stn. MBT 142 (mm). – Length proboscis (dorsal) 1.24; greatest diameter proboscis 0.64; length first trunk segm. 1.59; length second trunk segm. 0.87; length third trunk segment 0.82; length fourth trunk segment (to tip fourth lateral process) 1.05; width across second lateral processes 2.15; length abdomen 0.91.

Leg 3: first coxa 0.90; second coxa 1.64; third coxa 0.63; femur 3.78; first tibia 5.29; second tibia 5.12; tarsus 1.40; propodus 1.11; claw 0.40; auxiliary claws 0.20.

Etymology. – The specific name, *vulcanellum* (Latin = little volcano) alludes to the low, volcano-shaped cement gland apertures on the femur of the male.

Remarks. – This is no doubt the same species recorded as '*Nymphon* spec.' by Stock (1966), from one of the 'Calypso' stations off the South American Atlantic coast. In 1966, though it was recognized that probably a new species was concerned, it was not named because only a female was available. Now, the male being discovered, I have no hesitation any more to attribute this highly characteristic animal to a new species.



Figs. 52-56. *Nymphon vulcanellum* sp. n. (♂ from Stn. MBT 149, ♀ from Stn. MBT 142). 52, trunk, ♀, dorsal (scale F); 53, ocular tubercle, ♂, frontal (free-hand sketch); 54 chela, ♀ (A); 55, leg 3, ♂ (F); 56, femur, ♀ (F). Scales after fig. 80.

By the large chela, the absence of propodal heel spines, and the slender palp segments, the new species looks like the North Atlantic *N. macrum* Wilson, 1880. Obvious differences are, apart from the volcano-shaped cement gland apertures, the ratio tibia 1/tibia 2 (subequal in the new species, tibia 2 by far the longest in *N. macrum*), the low number of denticles on the oviger claw, and the low number of marginal teeth on the compound oviger spines of the new species. Finally, the oviger implantation is in contact with the first lateral process in the new species, implanted well in front of it in *N. macrum*.

For the differences from *N. inaequipes*, consult the remarks under the latter.

Distribution. – Found often together with *N. inaequipes* (vide supra), but is less abundant. Its bathymetrical range lies between 21 and 250 m.

Family Callipallenidae

Callipallene evelinae Marcus, 1940

C. evelinae Marcus, 1940b: 31-33, fig. 2 A-D.

Material. – 1 juv., USP, Stn. F 10: Rocky intertidal of Ponta de Santa Rita, Enseada do Flamengo, Ubatuba, State of São Paulo, on *Dyctiota* sp., 12 Dec 1965; 2 ♀, Project Isotan-Draga I (PID), Stn. MBT 145: 23°25'S 42°27'W, 130 m, 3 Sep 1970; 1 ♀, PID, Stn. MBT 155: 22°22'S 41°32'W, 34 m, 5 Sep 1970.

Remarks. – *C. evelinae* is mainly characterized by male characters (presence of plumose setae on distal leg segments, absence of lobe on 5th oviger segment). Thus, the identification of the present material (lacking males) must be taken with some reservation. However, nothing in the morphology seems to prevent identification with *C. evelinae*, previously known only from Ilha das Palmas, Bahia de Santos, 0-5 m. The present records extend the range to east of Rio de Janeiro, and to a depth of 130 m.

Callipallene gabriellae Corrêa, 1948

C. gabriellae Corrêa, 1948: 1-4, figs. 1-6.

Material. – 76 spms. (incl. ovigerous males and juveniles), USP, Stn. P.E.: Collected by hand by divers in the infralittoral zone on seaweeds growing on rock, Ponta do Espia, Ubatuba, State of São Paulo, 20 Sep 1964.

Remarks. – This species is extremely close to *C. emaciata* (Dohrn, 1881), known from the Mediterranean and from New England to the West Indies. Child (1979: 41) examined specimens from the entire range of *C. emaciata* and made some observations on its morphology. In the configuration of the propodal spines and the auxiliary claws, the present material agrees with Child's observations.

Evidently, the shape of the trunk, oviger spines, proportions of the leg segments, curvature of the propodus, and length of the auxiliary claws, *C. gabriellae* and *C. emaciata* are practically identical. Corrêa used the presence or absence of a suture between trunk segments 3 and 4 as a key character to separate the two species, but in the large sample from Brazil at hand, this feature proved to be too variable to be reliable.

The only characters that made me decide to retain *C. gabriellae* as a distinct species, are its more swollen male(!) femur and the number of teeth on the fingers of the chela. Child (1979, in key) records about 15 teeth on each finger of *C. emaciata*, whereas in the present material of *C. gabriellae* there are 6-9 teeth. The number of propodal heel spines, considered to be diagnostic character by Child, varies between 4 and 5 in *C. gabriellae*.

C. gabriellae has been described from the upper littoral zone of Ilha das Palmas, Bahia de Santos (Brazil). As far as I know, no further specimens have ever been recorded.

Callipallene margarita (Gordon, 1932)

Pallene margarita Gordon, 1932b: 82-85, figs. 40-41.

Callipallene margarita; Marcus 1940b: 30; Corrêa 1948: 6; Child 1982a: 26.

? *Callipallene margarita*; Hedgpeth 1961: 3, fig. 1.

Material. – 1 ♂, 3 juvs., Project Isotan-Draga I, Stn. MBT 149: 23°41'S 41°55'W, 250 m, 4 Sep 1970.

Remarks. – The formula of the compound oviger spines in the present male is 8:6:8:8, which is lower than the number recorded by Gordon (1932b), but about similar to that found by Hedgpeth (1961).

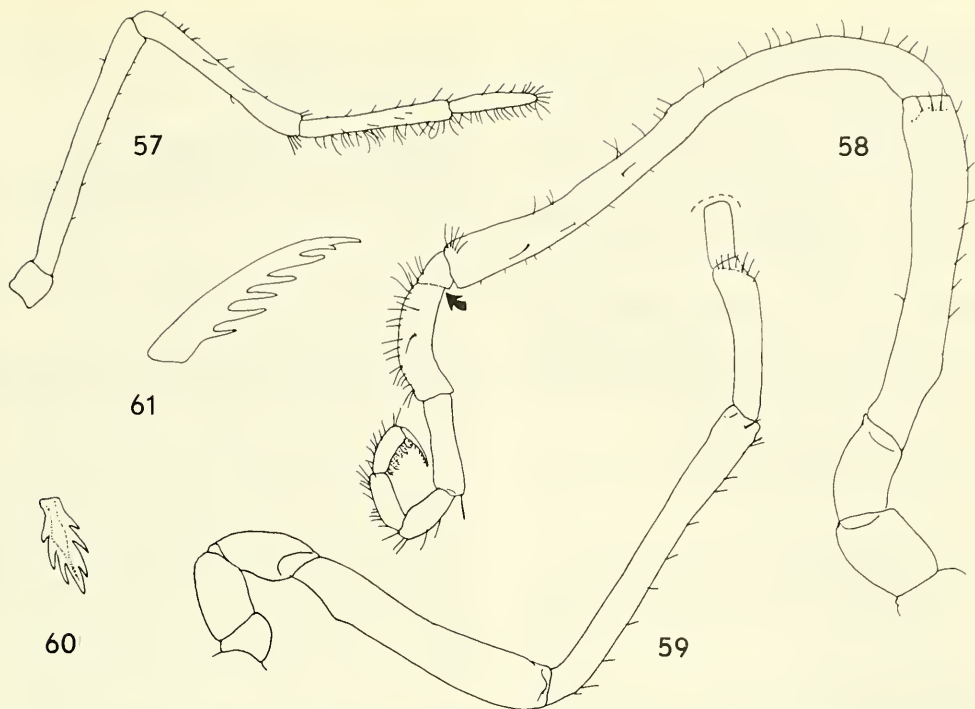
The species is known from South Georgia, N. of the Falkland Islands, 120-320 m (Gordon 1932b); southern Chile, 70 m (Hedgpeth 1961), and from the Argentine slope, between 36°53'S and 38°13'S, 454-2323 m (Child 1982a). The present record extends the range of the species further north to 23°41'S, but falls within the bathymetrical range.

Callipallene producta (Sars, 1888)

C. producta; Stock 1990: 227 [refs.].

Material. – 1 ♂, Project Isotan-Draga I, Stn. MBT 145: 23°25'S 42°27'W, 130 m, 3 Sep 1970.

Remarks. – This specimen resembles closely Sars' (1891) figures based on material from northern Europe, except that the second tibia is provided with some long setae. This species is mainly distributed in the northern and central Atlantic, from Norway to the Cape Verde Islands. It is new to Brazil.



Figs. 57-61. *Nymphon vulcanellum* sp. n. (♂ from Stn. MBT 149, ♀ from Stn. MBT 142). 57, palp, ♀ (scale A); 58, oviger, ♂ (A); 59, proximal part of oviger, ♀ (A); 60, compound spine of oviger segment 10, ♂ (free-hand sketch); 61, terminal oviger claw, ♂ (free-hand sketch). Scale after fig. 80.

Pallenoides amazonica Stock, 1975

P. amazonica Stock, 1975a: 1012-1015, figs. 23-24; see also Arnaud & Child 1988: 142-143.

Material. – 1 juv., Project Isotan-Draga I (PID), Stn. MBT 148: 23°19'S 41°57'W, 136 m, 3 Sep 1970; 1 ♀, 2 juvs., PID, Stn. MBT 157: 21°46'S 40°58'W, 15 m, 5 Sep 1970; 2 ♀, 2 juvs., PID, Stn. MBT 163: 21°29'S 40°56'W, 17 m, 6 Sep 1970; 1 ♂ oviger, 3 ♀, 2 juvs., PID, Stn. MBT 165: 21°20'S 40°39'W, 28 m, 6 Sep 1970.

Remarks. – The eggs carried by the ovigerous male from Stn. MBT 165 are, in preserved state, of a deep-brown colour.

The species was described from Brazilian shelf waters, but much further north (between 00°31'N and 02°15'S). Arnaud & Child's South African record (1988) based on a larva, is 'certainly questionable' (1988: 143).

Family Phoxichilidiidae

Pallenopsis (Pallenopsis) boehmi Schimkewitsch, 1930

P. boehmi Schimkewitsch, 1930: 236-237 [new name for *P. fluminensis*, sensu Böhm 1879, nec Krøyer 1844]. –

Marcus 1940a: 190-191; Marcus 1940b: 22; Stock 1973: 349-350, figs. 1-10 [redescr. of types]; Stock 1975a: 1018 [in key].

P. longicoxa Stock, 1966: 394-396, fig. 4 [syn. n.].

Material. – 1 ♂, R. V. 'Prof. W. Besnard', Stn. RIG 588: 23°50'S 44°16'W, 100 m, 7 Feb 1968; 2 ♂, 1 ♀, R. V. 'Prof. W. Besnard', Stn. RG 1333: 23°13' 44°18'W, 35 m, 17 Feb 1968; 2 ♂, 3 ♀, R. V. 'Prof. W. Besnard', Stn. 1477: 23°29'S 42°54'W, 105 m, 9 March 1971; 1 ♀, Project Isotan-Draga I, Stn. MBT 153: 22°48'S 41°14'W, 65 m, 4 Sep 1970.

Remarks. – *P. boehmi* was based on females (see Stock 1973), whereas *P. longicoxa* was based on males. Some of the present samples contain both sexes, and prove *boehmi* to be a senior synonym of *longicoxa*, as already suspected by Stock (1973). The length of the auxiliary claws is variable in these samples: in some specimens they are some 40% of the length of the main claw, in others they are fully half as long.

P. boehmi is predominantly a cold-water species, distributed from Magellan Strait to southern Brazil. One of the above stations, Stn. 1477, is located very close to the type-locality of *P. longicoxa*.

Pallenopsis (Pallenopsis) candidoi de Mello-Leitão, 1949

P. (P.) candidoi; Stock, 1975a: 1030, fig. 31 a-b [refs.].

Material. – 1 ♂, 1 ♀, R. V. 'Prof. W. Besnard', Stn. RD 54: 18°54.8'S 39°15.4'W, 41 m, 12 July 1972.

Remarks. – This species is known from southern Brazil to Surinam, between 15 and 65 m.

Pallenopsis (Pallenopsis) fluminensis (Krøyer, 1844)

P. (P.) fluminensis; Stock 1975a: 1020-1021, fig. 25 [refs.].

Material. – 1 ♂, R. V. 'Prof. W. Besnard', Stn. RG 1325: 23°14'S 43°56.5'W, 49 m, 16 Feb 1968.

Remarks. – A Brazilian species, known from the State of São Paulo to N. of Pernambuco. Depth range 0-49 m.

Pallenopsis (Pallenopsis) kempfi Stock, 1975

P. (P.) kempfi Stock, 1975a: 1025-1028, figs. 28-29; Stock 1986: 427-429, fig. 8 a-f.

Material. – 1 ♂, R. V. 'Prof. W. Besnard', Stn. 1848: 30°22'S 48°41'W, 178 m, 3 Aug 1972.

Remarks. – Previously recorded from Florida (ca. 24°36'N) to Brazil (ca. 04°13'S). The present records forms a significant southward extension of the range.

Pallenopsis (Pallenopsis) tumidula Loman, 1923

P. (P.) tumidula Loman, 1923: 32-34, fig. G; Marcus 1940a: 191; Marcus 1940b: 24 [in key]; Stock 1957: 103-105, fig. 18; Stock 1966: 393, fig. 3c; Stock 1975a: 1018 [in key].

Material. – 1 ♂ ovig., 2 ♀, R. V. 'Prof. W. Besnard', Stn. RG 1332: 23°14.3'S 44°13.3'W, 42 m, 17 Feb 1968; 1 ♂ ovig., 2 ♀, R. V. 'Prof. W. Besnard', Stn. 1883: 30°22'S 48°41'W, 178 m, 3 Aug 1972.

Remarks. – Previously recorded from off La Plata (ca. 37°30'S). The present records extend the range to southern Brazil (23°14'S).

Anoplodactylus aragaii Sawaya, 1950

(figs. 63-64)

A. aragaii Sawaya, 1950: 63-67, 77-80, pls. I-II.

Material. – 1 ♂ ovig., R. V. 'Prof. W. Besnard', Stn. RD 56: 18°54.7'S 38°53.5'W, 38 m, 12 July 1972.

Remarks. – The chelifore and chela were not illustrated in great detail before; therefore some figures of this appendage are incorporated in the present paper. The single specimen collected agrees in every detail

with Sawaya's description. Previously recorded from 20°33'S 40°14'W, 35 m.

Anoplodactylus brasiliensis Hedgpeth, 1948

A. brasiliensis Hedgpeth, 1948: 224 [pro *A. pygmaeus* sensu Marcus 1940b: 63-65, Pl. VI fig. A-D, nec Hodge, 1864].

Material. – 2 ♀, 6 juvs. & larvae, USP, Sm. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds growing on rocky shore, infralittoral, 20 Nov 1964.

Remarks. – I agree with Lebour (1945) and Hedgpeth (1948) in considering this south Brazilian shallow water species different from *A. pygmaeus*, under which name it was recorded by Marcus (1940b). Hedgpeth coined the name *A. brasiliensis* for it, which is adopted here. The species differs from *A. pygmaeus* by the presence of small auxiliary claws, and the absence of a tubercle on the lateral processes (a single spinule is present, however). The propodal sole has a rather short lamina, preceded by 3 or 4 sole spines. Unfortunately, the present collection contains no males, so I can add nothing to Marcus' description.

Anoplodactylus evelinae Marcus, 1940

A. evelinae; Child 1982b: 368-369 [refs.].

Material. – 24 spms., usp, Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds growing on rocky shore, infralittoral, 20 Nov 1964; 1 ♀, usp, Stn. F 10: Ponta Santa Rita, Enseada do Flamengo, Ubatuba, State of São Paulo, on intertidal algae (*Dyctiota* sp.) on rocky shore, 12 Dec 1965; 1 ♀, usp, Stn F 27: Rocky shore between Praia do Dionísio and Praia do Flamengo, Enseada do Flamengo, Ubatuba, State of São Paulo, on algae slightly exposed at low tide, 15 Feb 1965.

Remarks. – The species was described from the same general area; later records extended the range to shallow waters of the West Indies.

Anoplodactylus insignis (Hoek, 1881)

A. insignis; Stock 1975a: 1056-1058, fig. 44 [refs.]; Stock, 1986: 437-438, fig. 15 a-b.

Material. – 1 ♂ (fragm.), Project Isotan-Draga I, Stn. MBT 165: 21°20'S 40°39'W, 28 m, 6 Sep 1970; 1 ♀, R. V. 'Prof. W. Besnard', Stn. RD 54: 18°54.8'S 39°15.4'W, 41 m, 12 July 1972.

Remarks. – Originally described by Hoek from Brazil (Bahía, 13-37 m). Later records show it to have a vast range in the Caribbean and on the American east coast up to North Carolina. The female from Stn. RD 54 belongs to var. *calcaratus* Stock, 1986, previously found in the West Indies, Venezuela and the Guyanas.

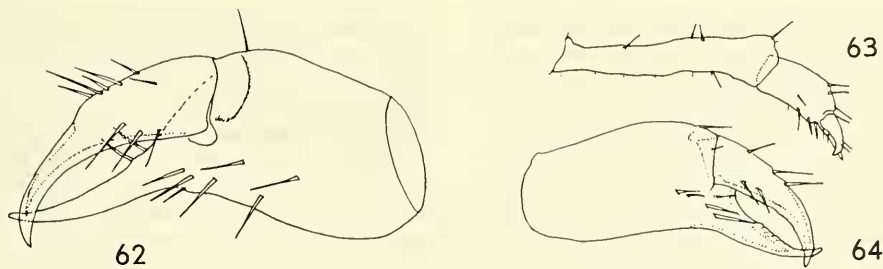


Fig. 62. *Anoplodactylus stictus* Marcus, 1940 (♀ from Stn. MBT 165), chela (scale E). Figs. 63-64. *Anoplodactylus aragai* Sawaya, 1950 (♂ from Stn. RD 56). 63, chelifore (scale B); 64, chela (E). Scales after fig. 80.

Anoplodactylus maritimus Hodgson, 1914

A. maritimus, Stock 1975a: 1072, 1074, fig. 54 [syn. & distr.].

Material. – 1 ♀, R. V. 'Prof. W. Besnard', Stn. RG 1331: 23°14.7'S 44°09.4'W, 45 m, 16 Feb 1968; 2 ♂, Project Isotan-Draga 1 (PID), Stn. MBT 153: 22°48'S 41°14'W, 65 m, 4 Sep 1970; 2 ♂, PID, Stn. MBT 164: 21°15'S 40°50'W, 19 m, 6 Sep 1970; 2 ♂, 4 ♀, PID, Stn. MBT 184: 24°33'S 46°50'W, 30 m, 30 May 1971; 4 ♂, 2 ♀, 2 juvs., PID, Stn. MBT 195: 24°03'S 44°59'W, 73 m, 1 June 1971; 15 ♂, 12 ♀, PID, Stn. MBT 206: 23°14'S 44°03'W, 52 m, 3 June 1971.

Remarks. – This species, often associated with floating *Sargassum*, is widely distributed in the (sub)-tropical Atlantic. It is recorded here from the first time from Brazil.

Anoplodactylus monotrema Stock, 1979

A. monotrema, Child 1982b: 372 [refs.].

Material. – 1 ♂, 1 ♀, 1 juv., USP, Stn. F 10: Ponta de Santa Rita, Enseada do Flamengo, Ubatuba, State of São Paulo, on intertidal algae (*Dyctiota* sp.) on rocky shore, 12 Dec 1965; 1 ♂, R. V. 'Prof. W. Besnard', Stn. RD 54: 18°54.8'S 39°15.4'W, 41 m, 12 July 1972.

Remarks. – The males in this collection have one slit-like cement gland aperture on the legs, and agree also otherwise with the original description. The female from Stn. F 10 has more 'angular' corners of the proboscis, and thus resembles *A. robustus* (Dohrn, 1881), but has well-spaced lateral processes 1 and 2 as in *A. monotrema*.

These records confirm the presence of *A. monotrema* on the coasts of Brazil, already anticipated by Stock (1979).

Anoplodactylus petiolatus (Krøyer, 1844)

A. petiolatus, Stock 1975a: 1072-1075, fig. 53 [incl. *A. longicollis* (Dohrn, 1881)].

A. guyanensis Child, 1977 [syn. n.].

Material. – 8 ♂ (of which 1 ovig.), 2 ♀, Project Isotan-Draga 1 (PID), Stn. MBT 50: 23°39'S 45°06'W, 28 m, 8 May 1970; 1 ♀, PID, Stn. MBT 77: 23°39'S 43°09'W, 128 m, 12 May 1970; 4 ♂, 1 ♀, PID, Stn. MBT 101: 25°51'S 47°54'W, 41 m, 19 June 1970; 1 ♂, PID, Stn. MBT 106: 26°45'S 47°16'W, 130 m, 20 June 1970; 9 spms., PID, Stn. MBT 113: 27°19'S 48°15'W 54 m, 21 June 1970; 3 ♂, 2 ♀, PID, Stn. MBT 116: 27°59'S 47°31'W, 150 m, 22 June 1970; 1 ♀, PID, Stn. MBT 127: 29°33'S 48°46'W, 118 m, 25 June 1970; 1 ♀, PID, Stn. MBT 128: 29°23'S 49°10'W, 54 m, 25 June 1970; 1 ♂, PID, Stn. MBT 141: 23°25'S 43°00'W, 113 m, 2 Sep 1970; 5 ♂, 1 ♀, PID, Stn. MBT 145: 23°25'S 42°27'W, 130 m, 3 Sep 1970; 3 ♂, PID, Stn. MBT 147: 23°01'S 41°59'W, 66 m, 3 Sep 1970; 1 ♂, 3 ♀, 1 juv., PID, Stn. MBT 148: 23°19'S 41°57'W, 136 m, 3 Sep 1971; 1 ♂, 3 juvs., PID, Stn. MBT 152: 23°03'S 41°10'W, 98 m, 4 Sep 1970; 5 ♂, 2 ♀, 8 juvs., 1 larva, PID, Stn. MBT 161: 21°42'S 40°15'W, 56 m, 6 Sep 1970; 1 ♂, PID, Stn. MBT 164: 21°15'S 40°15'W, 19 m, 6 Sep 1970; 6 ♀, PID, Stn. MBT 171: 25°05'S 47°40'W, 20 m, 27 May 1971; 16 spms., PID, Stn. MBT 173: 25°32'S 47°11'W, 55 m, 27 May 1971; 1 ♂, 3 ♀, PID, Stn. MBT 185: 24°12'S 46°09'W, 38 m, 30 May 1971; 4 ♂, 3 ♀, 2 juvs., PID, Stn. MBT 186: 24°28'S 45°54'W, 59 m, 30 May 1971; 1 ♂, PID, Stn. MBT 195: 24°03'S 44°59'W, 73 m, 1 June 1971; 5 ♂, 3 ♀, PID, Stn. MBT 197: 23°47'S 44°44'W, 65 m, 1 June 1971; 2 ♂, 1 ♀, PID, Stn. MBT 210: 23°46'S 43°10'W 128 m, 4 June 1971; 1 ♂, R. V. 'Prof. W. Besnard' (rvwb), Stn. RIG 588: 23°50'S 44°16'W, 100 m, 7 Feb 1969; 2 ♀, rvwb, Stn. RD 4: 19°59'S 39°56'W, 41 m, 6 July 1972; 1 ♂, rvwb, Stn. RD 5: 19°54'S 39°50'W, 51 m, 6 July 1972; 1 ♂ ovig., rvwb, Stn. RD 50: 19°02.5'S 39°30.6'W, 28 m, 12 July 1972; 1 ♂, 1 ♀, rvwb, Stn. RD 54: 18°54.8'S 39°15.4'W, 41 m, 12 July 1972; 1 ♀, rvwb, Stn. RD 71: 18°34'S 39°14.6'W, 35 m, 14 July 1972; 1 ♂, rvwb, Stn. RD 74: 18°34'S 38°38'W, 59 m, 14 July 1972; 1 ♂, rvwb, Stn. RD 82: 19°55'S 39°54'W, 46 m, 16 July 1972; 1 ♂ ovig., Project Petrobas/USP, Stn. RD 36: 19°18.1'S 39°39.4'W, 16 m, 10 July 1972.

Remarks. – The present material gave me considerable trouble. After re-examination of many samples from various origins (North Sea, Bay of Biscay, Israel, the Guyanas), I came to the conclusion that *A. petiolatus* is a variable species and that the variation occurs in a geographically unordered way. North Sea specimens have the lowest number of spines on the propodal sole in front of the lamina (viz. 3 to 6), medium-sized tubercles on the lateral processes, and no tubercle on coxa 1. Guyana specimens have 4 to 8 spines on the propodal sole, very tall tubercles on the lateral processes, and sometimes a distinct tubercle on coxa 1. Finally Brazilian specimens have the highest number (4 to 10) of spines on the propodal sole, medium-sized tubercles on the lateral processes, and a vestigial tubercle on coxa 1.

The Bay of Biscay specimens look very much like *A. guyanensis* Child, 1977, but the abdomen is slightly longer and less erect. Israel specimens look strongly like *A. vemae* Child, 1982, but oviger segment 2 is shorter. The length of the cement gland tube and the trunk segmentation can vary as well. In our Brazilian collection, the tube is usually rather short, and specimens with an unsegmented trunk are more common, but other specimens show a segmentation line between trunk segments 1 and 2, or between 1, 2 and 3. Comments on the variability of *A. petiolatus* are already briefly provided in the papers by Stock (1966, 1975a). For these reasons, I consider *A. petiolatus* a variable species, and has united *A. longicollis* (Dohrn, 1881) from the Mediterranean and *A. guyanensis* Child, 1977 with *A. petiolatus* (Kröyer, 1844).

A. petiolatus was recorded before from Brazil (Marcus, 1940b) and northern Argentina (Stock, 1966).

Anoplodactylus spurius sp. n. (figs. 65-75)

Type material. – 1 ♂ holotype, 1 juv., Project Isotan-Draga 1 (PID), Stn. MBT 211: 23°59'S 43°01'W, 220 m, 4 June 1971 (ZMA Pa. 3448); 1 ♀, 3 juvs. (paratypes), PID, Stn. MBT 142: 23°46'S 43°00'W, 150 m, 2 Sep 1971 (ZMA Pa. 3449); 3 ♂ (paratypes), PID, Stn. MBT 145: 23°25'S 42°27'W, 130 m, 3 Sep 1970 (ZMA Pa. 3450); 1 ♀, 1 juv. (paratypes), PID, Stn. 159: 22°00'S 40°06'W, 90 m, 5 Sep 1970 (ZMA Pa. 3451); 1 ♀ (paratype), PID, Stn. MBT 164: 21°15'S 40°50'W, 19 m, 6 Sep 1970 (ZMA Pa. 3452).

Description. – Trunk segments 1 and 2, and 2 and 3 well-articulated, intersegmental line between segments 3 and 4 vestigial. One tall spur and 1 or 2 spinules on distodorsal end of each lateral process. Lateral processes separated by interval greater than own diameter. Ocular tubercle with 2 minute lateral tubercles, tip conical; eyes pigmented. Abdomen more or less strongly directed upward, as long as 4th lateral process.

Proboscis of adult female with 2 ventral alar processes, free part of each lobe pointing forward. In ventral view, lobes are heart-shaped. Male proboscis without alar processes. Proboscis (♂, ♀) surrounded by collar-like expansion with on either side a rounded swelling which might represent a rudiment of palp.

Chelifore scape just overreaching tip of proboscis, with low distal spur. Chela with slender palm; curved fingers slightly longer than palm. Both palm and ectal margin of movable finger with several long setae. Each finger with 2 proximal setae on endal margin.

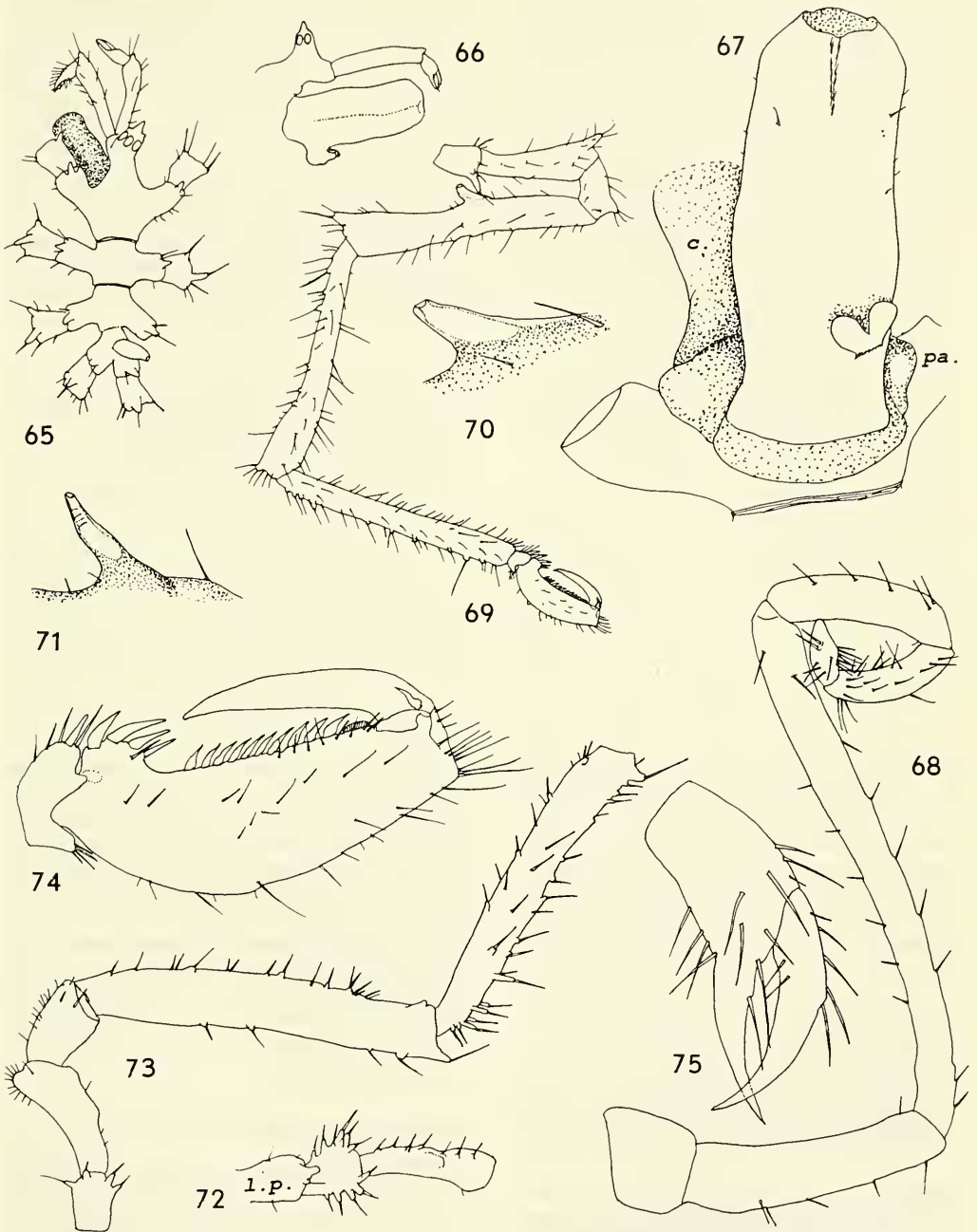
Oviger 6-segmented; segm. 2 slightly less than half as long as segm. 3; segm. 3 very elongate; segms. 5 and 6 with several long setae; segm. 6 longer than wide, pointed.

Legs setose, especially femur and tibiae. Tubercles and spurs variously developed (strongest development in one of the females!). Coxa 1 with 2 to 10 tubercles, most tubercles spine-tipped. Coxa 2 with ventrodistal genital spur only (male spur thump-shaped, present of legs 3 and 4; female spur broadly rounded, on all legs). Coxa 3 sometimes with ventrodistal, rounded process. Femur slightly longer than tibiae 1 and 2, with distodorsal spur; setae implanted on low or vestigial tubercles. Tibiae 1 and 2: setae implanted on tubercles, which may assume columnar shape. Tarsus short. Propodus with strong heel forming right angle with sole, armed with 1 or 2 basal spines and row of thin spinules; propodal lamina very short. Rudimentary auxiliary claws present. Cement gland slightly proximad of middle of dorsal surface of femur of all legs in male, discharging through strong, heavy, tapering, thump-shaped tube directed obliquely distad; length of tube variable: usually as illustrated in fig. 70, but in male from Stn. MBT 211 more slender (fig. 71).

Measurements (♂ from Stn. MBT 211) in mm. – Length proboscis (ventral) 1.14; greatest diameter proboscis 0.34; length trunk (frontal margin cephalic segment to tip 4th lateral process) 1.76; width across 2nd lateral processes 1.08. Leg 3: first coxa 0.30; second coxa 0.96; third coxa 0.46; femur 1.85; first tibia 1.78; second tibia 1.82; tarsus 0.15; propodus 0.64; claw 0.49.

Etymology. – The specific name, *spurius* (Latin = illegitimate child) alludes to the dubious taxonomic position of the new species.

Remarks. – By the presence of two ventral outgrowths on the female proboscis, as well as by almost all points of the general morphology (structure of chela, oviger, shape of propodus, short propodal lamina, genital spurs in both sexes...) the present material shows a close similarity to *A. stictus* Marcus, 1940. The differences with *A. stictus* pertain to the degree of setosity and tuberculation of legs and lateral processes and to a longer cement gland duct. These characters



Figs. 65-75. *Anoplodactylus spurius* sp. n. (65, 68, 69, 70 and 74 from Stn. MBT 145; 66, from Stn. MBT 165; 67, 73 and 75 from Stn. MBT 159; 71 and 72 from Stn. MBT 211). 65, trunk, ♂, dorsal (scale F); 66, cephalon, ♀, from the right (free-hand sketch); 67, proboscis, ♀, ventral (B); 68, oviger, ♂ (B); 69 leg 3, ♂ (F); 70, 71, cement gland of leg 3, ♂ (B); 72, lateral process, coxae 1 and 2 of leg 2, ♂, dorsal (A); 73, leg 3, ♀ (A); 74, distal segments of leg 3, ♂ (B); 75, chela, ♀ (E). [*c* = cephalic segment; *l.p.* = lateral process; *pa.* = palp.] Scales after fig. 80.

may be subject to variation in *Anoplodactylus*. The length and number of tubercles, processes and spurs fluctuate for instance in *A. insignis* (Hoek, 1881) (see Stock 1986: 437), whilst the length of the cement gland duct is variable in *A. petiolatus* (vide supra). To complicate matters, the material attributed here to *A. spurius* sp. n. is not uniform throughout, but shows marked variability in degree of development of the leg armature and length of the gland tube. Moreover, Bremec et al. (1986: figs. 7-8) illustrate material from Argentina with a distinct tubercle on the lateral processes (as in *A. spurius*), but with a low cement gland duct and non-tuberculate legs (as in *A. stictus*).

Therefore, I find it hard to decide whether the present material represents a new species or just 'a more strongly armed' variety of *A. stictus*. I have decided to describe it as a new species, mainly to draw attention to the plasticity of the morphological characters in this genus. More material will be necessary to decide if the chosen solution was correct.

The following expression of character states separates for the moment *A. spurius* from *A. stictus*: (1) lateral processes with tall distodorsal tubercle in *spurius*, tubercle lower or absent in *stictus*; (2) coxa 1 with 2 to 10 tubercles in *spurius*, none in *stictus*; (3) cement gland rather long to long in *spurius*, short or rather short in *stictus*; (4) femur and tibiae with numerous long setae, placed on (tall) basal tubercles, in *spurius*; few setae and no basal tubercles in *stictus*.

Comparison with other species. – Child (1979) has described *A. reimerae* from the Pacific coast of Panamá that looks very similar to *A. spurius* (lateral processes and coxa 1 with tubercles). But *A. reimerae* has lateral (not ventral) alar processes on the female proboscis, its oviger segments have different proportional lengths, and a different terminal oviger segment setation. *A. spurius* is also very similar to *A. simulator* Stock, 1975 from Florida, but this species lacks ventral alar processes on the female proboscis (Stock 1986: 440).

Anoplodactylus stictus Marcus, 1940 (fig. 62)

A. stictus Marcus, 1940b: 65-68, pl. VI fig. 7E, pl. VII fig. 7A-D; Sawaya 1945: 231-234, pl. XXIII; de Castellanos 1965: 16-17; Stock 1966: 405; Bremec et al. 1986: 36-37, figs. 7-8.

Material. – 1 ♀, usp, Stn. P.E.: Ponta do Espia, State of São Paulo, on seaweeds growing in the infralittoral of rocky shore, 20 Nov 1964; 1 ♂, 5 ♀, Project Isotan-Draga I (PID), Stn. MBT 50: 23°39'S 45°06'W, 28 m, 8 May 1970; 1 ♀, PID, Stn. MBT 149: 23°41'S 41°55'W, 250 m, 4 Sep 1970; 1 ♂, 2 ♀, 3 juvs., PID, Stn. MBT 155: 27°22'S 41°32'W, 34 m, 5 Sep 1970; 1 ♀, PID, Stn. MBT 156: 22°06'S 40°53'W, 32 m, 5 Sep 1970; 1 ♀, 16 juvs., PID, Stn. MBT 157: 21°46'S 40°58'W, 15 m, 15 Sep 1970; 1 ♀, PID, Stn. MBT 171:

25°05'S 47°40'W, 20 m, 27 May 1971; 2 ♀, PID, Stn. MBT 173: 25°32'S 47°11'W, 55 m, 27 May 1971; 3 ♂, 1 ♀, PID, Stn. MBT 195: 24°03'S 44°59'W, 73 m, 1 June 1971; 5 ♂, 6 ♀, PID, Stn. MBT 197: 23°47'S 44°44'W, 65 m, 1 June 1971; 1 ♂, PID, Stn. MBT 206: 23°14'S 44°03'W, 52 m, 3 June 1971; 1 ♀, R. V. 'Prof. W. Besnard' Stn. RD 4: 19°59'S 39°56'W, 41 m, 6 July 1972.

Remarks. – This species is known shallow waters, mostly in the upper part of the shelf, of the coast of Brazil (Marcus 1940b, Sawaya 1945) and northern Argentina (de Castellanos 1965; Stock 1966; Bremec et al. 1986). The bathymetrical range of the species is extended by the present records to 250 m. An illustration of the chela is presented here (fig. 62), to allow for proper comparison with *A. spurius* (see above).

Endeis biseriata Stock, 1968

Endeis biseriata Stock, 1968: 57-60, fig. 21; Stock 1970b: 1; Stock 1974: 17; Stock 1979: 28-30, fig. 9.

Endeis biseriata [lapsus calami]; Child 1988b: 20; Child 1990: 332-333.

Phoxichilus meridionalis, Loman 1908 [nec Böhm, 1879]: 78-79, pl. XI figs. 153-155.

Material. – 1 ♂, USP, Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds in the infralittoral of rocky shore, 20 Nov 1964; 1 ♀, 2 juvs., usp, Stn. F 23: Enseada do Flamengo, Ubatuba, State of São Paulo, amongst ascidians, bryozoans and sponges growing of large boulders in infralittoral, 13 Feb 1965.

Remarks. – This species is known from almost the entire tropical Indo-Pacific, from Hawaii to the Great Barrier Reef in the east, to the Gulf of Eilat and Madagascar in the west. The only published Atlantic record (Stock 1979) is, like the present records, from Brazil, but in ZMA there is also a sample from the mediolittoral zone of Antigua (West Indies). The single available male of the present collection has the cement gland pores arranged in 2 rows on the posterior surface of the tibiae. A count of the longest row on leg 4 amounts to about 29 pores. The 3 distal femoral spurs are rather short (as in Stock's 1979, fig. 9c). This is a shallow-water species, found between 0 and 46 m.

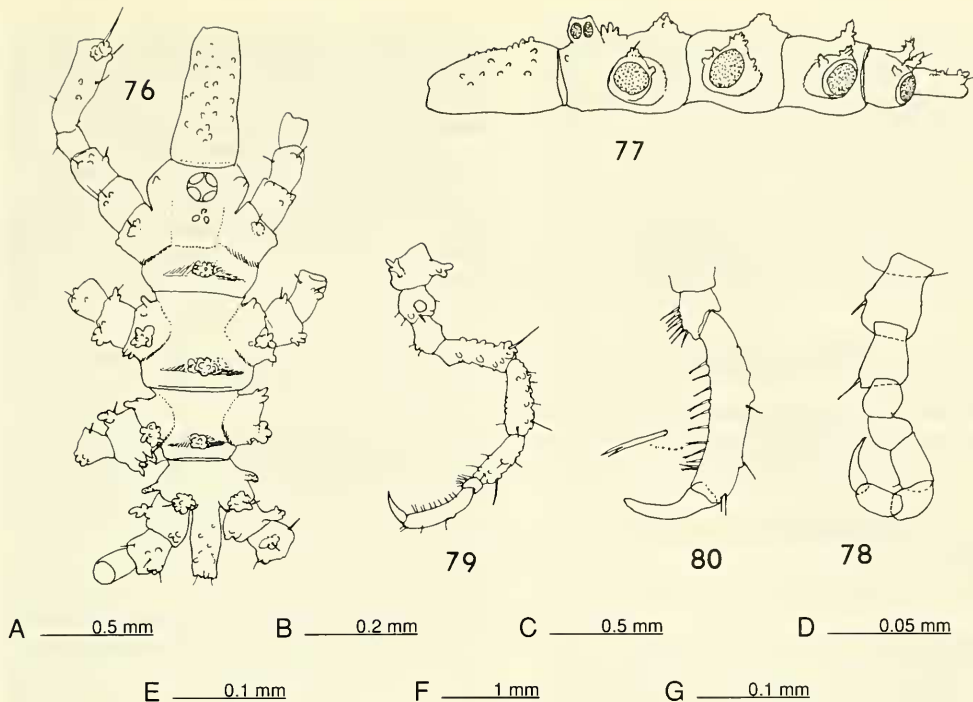
Family Colossendeidae

Colossendeis geoffroyi Mañe-Garzón, 1944

C. geoffroyi Mañe-Garzón, 1944: 1-6, figs. 1-5; Stock 1966: 396-397, fig. 3f; Larramendy 1974: 149-152, figs. 1-3.

Material. – 1 specimen (fragm.), probably this species, Project Isotan-Draga I, Stn. MBT 141: 23°25'S 43°00'W, 113 m, 2 Sep 1970; 4 spms., R. V. 'Prof. W. Besnard', Stn. 1743: 33°50'S 51°51'W, 65 m, 19 Apr 1972.

Remarks. – The record from Stn. 1743 is rather close to the type-locality, 36°05'S 53°03'W, 130 m. If the fragmentary specimen from Stn. MBT 141 (dis-



Figs. 76-80. *Pycnogonum ornans* sp. n. (♂ holotype). 76, trunk, dorsal (scale A); 77, trunk, from the left (A); 78, oviger (E); 79, leg 3 (A); 80, distal segments of leg 3 (B).

tal leg segments and palps lacking) is really this species, the range would be considerably extended in northward direction. Minnaard & Zamponi (1984: 272-275, fig. 11) describe a *Colossendeis* identified as *C. geoffroyi* from the 'Walther Hertwig' 1966 cruise, Stn. 340, 200 m. This station is off Mar del Plata, Argentina (ca. 40°S). Both the rough figures and the measurements provided by the Argentinean authors seem to indicate that a different species is concerned, because the tarsus is almost twice as long as the propodus, whereas in all other specimens of *C. geoffroyi* recorded, there is no great length difference between tarsus and propodus.

Family Rhynchothoracidae

Rhynchothorax mediterraneus Costa, 1861

R. mediterraneus; Child 1988a: 56 [refs.]; Stock 1988: 507; Arnaud & Krapp 1990: 4.

Material. – 14 spms., Project Isotan-Draga (PID), Stn. MBT 155: 22°22'S 41°32'W, 34 m, 5 Sep 1970; 1 spm., PID, Stn. MBT 156: 22°06'S 40°53'W, 32 m, 5 Sep 1970; 4 spms., PID, Stn. MBT 159: 22°00'S 40°06'W, 90 m, 5 Sep 1970; 1 spm., PID, Stn. MBT 169: 21°50'S 39°52'W, 1100

m, 8 Sep 1970; 1 spm., Project Petrobas/USP (PP), Stn. RD 31: 19°27.5'S 39°03.4'W, 58 m, 10 July 1972; 1 spm., PP, Stn. RD 53: 18°56'S 39°26'W, 27 m, 12 July 1972.

Remarks. – The present specimens agree pretty well with the illustrations of *R. mediterraneus* (cf. Dohrn 1881; Stock 1974), but for a few details that I do not consider of great importance. These differences concern (1) the anterior and posterior spurs on coxa 1 which in some specimens of the present collection are taller; (2) the presence in some specimens of a well-marked tubercle on palp segment 2; (3) a narrow, unarmed 2nd segment in the palp, vaguely indicated in Mediterranean material, is more distinctly present in Brazilian specimens; (4) oviger segments 5 and 6 are subequal (versus 6 > 5); (5) the posteroventral spur on coxa 3 of leg 3 ♂ is less pronounced than Dohrn's figures suggests.

The species was recorded before from Brazil by Zago (1970) and Zilberberg (1963). Child (1988a) re-examined some of Zilberberg's specimens and concluded that they consisted of a mixture of *R. mediterraneus* and *R. monnioti*. Apart from Brazil, *R. mediterraneus* has been recorded from the Mediterranean basin (see Arnaud & Krapp 1990, for references), Madagascar (Stock 1974), off Gibraltar (Stock 1988),

and the Seychelles (Child 1988a). The present records fall within the known bathymetrical range of the species (1-200 m), except for Stn. MBT 169, which extends this range to 1100 m.

Family Pycnogonidae

Pycnogonum (Retroviger) cessaci Bouvier, 1911

P. (R.) cessaci; Stock 1975a: 1085, fig. 58d [syn., refs.]; Child 1979: 72 [refs.]; Child 1980: 325; Stock 1990: 231-232.

Material. – 37 spms., usp, Stn. P.E.: Ponta do Espia, Ubatuba, State of São Paulo, on seaweeds, rocky infralittoral, 20 Nov 1964.

Remarks. – The species was recorded before from Brazil, under the name of *Pycnogonum pamphorum* Marcus, 1940, a junior synonym.

Pycnogonum (Retroviger) gibberum Marcus & Marcus, 1963

P. gibberum Marcus & Marcus, 1963: 3-7, pl. I.

Material. – 1 ♂, 1 ♀, R. V. 'Prof. W. Besnard' (wb), Stn. RG 1325: 23°14'S 43°56.5'W, 49 m, 16 Feb 1968; 1 ♀, wb, Stn. RG 587: 23°22'S 44°26'W, 50 m, 7 Feb 1969; 1 juv., Project Isotan-Draga I (PID), Stn. MBT 50: 23°39'S 45°06'W, 28 m, 8 May 1970; 1 larva, PID, Stn. MBT 161: 21°42'S 40°15'W, 56 m, 6 Sep 1970; 1 ♀, Project Petrobas/USP (pp) Stn. RD 4: 19°59'S 39°56'W, 41 m, 6 July 1972; 1 juv., pp, Stn RD 25: 19°38'S 39°27'W, 9 Aug 1972.

Remarks. – *Pycnogonum elephas* Stock, 1966, from the same general area (between Rio de Janeiro and Rio de la Plata) is very similar to *P. gibberum*, but is almost twice as large. Moreover, the tubercles on the lateral processes and on coxa 1 are much less conspicuous than in *P. gibberum*, and the proboscis is, especially in lateral view more slender. It is possible that the male of *P. elephas* lacks ovigers; the male of *P. gibberum* has 7- (or 8-) segmented ovigers.

Apart from the three specimens on which the original description is based, *P. gibberum* has never been recorded again. The original material came from Ilha Lage de Santos, 32 m (Marcus & Marcus 1963: 6) and Alcatrazes Island, 36 m (Marcus & Marcus 1963: 3), both in Brazil. The present records extend both the geographical and the bathymetrical ranges slightly, to 19°38'S and 56 m.

Pycnogonum (Retroviger) ornans sp. n.
(figs. 76-80)

Type material. – 1 ♂ holotype, R. V. 'Prof. W. Besnard', Stn. RD 49: 19°05.5'S 39°14.3'W, 47 m, 12 Aug 1972 (ZMA Pa. 3441); 1 ♀ paratype, Project Isotan-Draga I, Stn. MBT 196: 23°31'S 44°57'W, 38 m, 1 June 1971 (ZMA Pa. 3442).

Description. – A small-sized *Pycnogonum*.

Male: Trunk long with respect to width, completely segmented. Lateral processes widely spaced. Ocular tubercle low, truncate; eyes well-pigmented. Three pointed tubercles behind ocular tubercle. Three mid-dorsal bosses near posterior margin of trunk segments 1, 2, and 3; bosses as tall as ocular tubercle; bosses 1 and 2 broadly conical, boss 3 narrower; each boss coarsely tuberculate. Similar bosses on dorsal surface of all lateral processes, that on lateral process 4 tallest. Anterior and posterior margins of lateral processes 2 and 3, posterior margin of lateral process 1, and anterior margin of lateral process 4 with 1 or more large tubercles. Abdomen reaching beyond middle of coxa 2 of leg 4, with small tubercles; distally truncate.

Proboscis widest near proximal end, slightly tapering, distally truncate. Dorsal surface with numerous small tubercles. Oviger 7-segmented; 1 spine on segments 1 and 2. Distal claw long, sharp, curved.

Legs short, thin. Coxa 1 of legs 2 to 4 with large, tuberculate or branched, somewhat upcurved, processes on dorso-anterior and dorso-posterior surface; coxa 1 of leg 1 with low tubercles only. Coxa 2 not strongly ornamented. Coxa 3 smooth. Femur not widened; with ventroproximal, triangular hump and several large tubercles; dorsodistal end marked by tuberculate bump and 1 strong seta. Tibia 1 slightly longer than femur, with smaller tubercles and shorter distal seta. Tibia 2 much shorter than tibia 1, about 3 times as long as wide, with some tubercles and rather short distal seta. Tarsus with ventral 'brush' of some 7 spinules. Propodus curved, longer than tibia 2; sole evenly armed with some 10 spinules, some of these bifid. Claw curved, less than half as long as propodus; no auxiliary claws.

Female: No ovigers. Ornamentation of dorsum and legs slightly less pronounced than in male.

Measurements of holotype (mm). – Length proboscis (dorsal) 0.71; greatest diameter proboscis 0.34; distal diameter proboscis 0.18; length first trunk segm. 0.73; length second trunk segm. 0.42; length third trunk segm. 0.33; length fourth trunk segm. (to tip lateral process) 0.25; width across second lateral processes 0.74; length abdomen 0.36. Leg 3: first coxa 0.17; second coxa 0.19; third coxa 0.15; femur 0.35; first tibia 0.36; second tibia 0.30; tarsus 0.06; propodus 0.35; claw 0.16.

Etymology. – The specific name *ornans* (Latin = ornamented) alludes to the ornamentation of trunk, lateral processes, proboscis, and certain leg segments with bosses and tubercles.

Remarks. – The narrow body shape is reminiscent of *P. cessaci* Bouvier, 1911 and *P. guyanae* Stock, 1975. However, *P. cessaci* possesses small auxiliary claws (absent in the new species), a more barrel-shaped proboscis, whereas the propodal armature tends to concentrate in the distal half of the sole

(evenly spread over sole in the species), tibia 1 shorter than the femur and post-ocular tubercles are absent. Both in *P. cessaci* and in *P. guyanae*, the coxae and the proboscis are devoid strong tubercles and bosses, so characteristic for the habit of the new species.

Although *P. leticiae* de Mello-Leitão, 1945 is generally considered synonymous with *P. cessaci*, its propodal armature resembles that of the new species. However, by the absence of strong tubercles on the legs, it is clear that the present species cannot be identified with *P. leticiae*.

Pentapycnon geayi Bouvier, 1911

P. geayi; Stock, 1975a: 1088 [refs.].

Material. – 1 juv., Project Isotan-Draga I, Stn. MBT 164: 21°15'S 40°50'W, 19 m, 6 Sep 1970; 1 juv., Project Petrobas/USP (PP), Stn. RD 51: 19°05.1'S 39°40.4'W, 18 m, 12 July 1972; 1 ♀, PP, Stn RD 67: 18°34'S 39°40', 15 m, 13 July 1972.

Remarks. – This extra-legged form is known from Puerto Rico, the Guyanas, and the northern coast of Brazil (southernmost record hitherto 06°04.7'S). The present records extend the range to 19°05.1'S.

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Table 1. Taxa represented in the usp collections and their biogeographic characterization.

In brackets after the species name, the following abbreviations are used:

- AA amphi-Atlantic elements (on the warm and warm-temperate Atlantic coasts of America and Europe, the Mediterranean basin, and the northern and central Atlantic coasts of Africa)
- CT circum-tropical elements
- E endemics of Brazil, the Mar del Plata region and the Guyanas
- M Magellanean elements (cold-water elements of South America, from Argentina south of the Rio de la Plata to the Falkland Islands and South Georgia, southern Chile, sometimes extending northward to southern Brazil).
- P also on the warm and warm-temperate Pacific coasts of the Americas
- WAW western Atlantic warm-water elements (from southern Florida and the West Indies, the Guyanas, to Brazil and the Mar del Plata in northern Argentina).

Family Ammotheidae

- Genus *Eurycyde* Schiödte, 1857
E. platyspina sp. n. [E]
- Genus *Nymphopsis* Haswell, 1884
N. melidae Sawaya, 1947 [E]
- Genus *Cilunculus* Loman, 1908
C. sp. [E?]
- Genus *Ammothella* Verrill, 1900
A. appendiculata (Dohrn, 1881) [AA]
A. rugulosa (Verrill, 1900) [WAW]
A. spinifera Cole, 1904 [WAW + P]
- Genus *Achelia* Hodge, 1864

- A. besnardi* Sawaya, 1951 [WAW]
A. columnaris sp. n. [E]
A. gracilis Verrill, 1900 [WAW]
A. sawyai Marcus, 1940 [mainly AA, possibly CT]
- Genus *Tanystylum* Miers, 1879
T. acuminatum Stock, 1954 [WAW]
T. evelinae Marcus, 1940 [E]
T. isabellae Marcus, 1940 [E]
T. isthmiacum difficile Stock, 1966 [WAW]
T. orbiculare Wilson, 1878 [AA, possibly CT]

Family Nymphonidae

- Genus *Nymphon* J.C. Fabricius, 1794
N. bullatum sp. n. [E]
N. inaequipes sp. n. [E]
N. vulcanellum sp. n. [E]

Family Callipallenidae

- Genus *Callipallene* Flynn, 1929
C. evelinae Marcus, 1940 [E]
C. gabriellae Corrêa, 1948 [E]
C. margarita (Gordon, 1932) [M]
C. producta (Sars, 1888) [AA]
- Genus *Pallenoides* Stock, 1951
P. amazonica Stock, 1975 [E]

Family Phoxichilidiidae

- Genus *Pallenopsis* (subgenus *Pallenopsis*) Wilson, 1881
P. (P.) boehmi Schimkewitsch, 1930 [M]
P. (P.) candidoi de Mello-Leitão, 1949 [E]
P. (P.) fluminensis (Krøyer, 1844) [E]
P. (P.) kempfi Stock, 1975 [WAW]
P. (P.) tumidula Loman, 1923 [M]

Genus Anoplodactylus Wilson, 1878

- A. aragaii* Sawaya, 1950 [E]
A. brasiliensis Hedgpeth, 1948 [E]
A. evelinae Marcus, 1940 [WAW]
A. insignis (Hoek, 1881) [WAW]
A. maritimus Hodgson, 1914 [AA]
A. monotrema Stock, 1979 [WAW]
A. petiolatus (Krøyer, 1844) [AA]
A. spurius sp. n. [E]
A. stictus Marcus, 1940 [E]

Genus Endeis Philippi, 1843

- E. biseriata* Stock, 1968 [CT]

Family Colossendeidae

- Genus *Colossendeis* Jarzynski, 1870
C. geoffroyi Mañé-Garzón, 1944 [E]

Family Rhynchothoracidae

- Genus *Rhynchothorax* Costa, 1861
Rh. mediterraneus Costa, 1861 [AA, probably CT]

Family Pycnogonidae

- Genus *Pycnogonum* Brünnich, 1764, subgenus *Retroviger* Stock, 1968
P. (R.) cessaci Bouvier, 1911 [AA]
P. (R.) gibberum Marcus & Marcus, 1963 [E]
P. (R.) ornans sp. n. [E]
- Genus *Pentapycnon* Bouvier, 1910
P. geayi Bouvier, 1911 [WAW]